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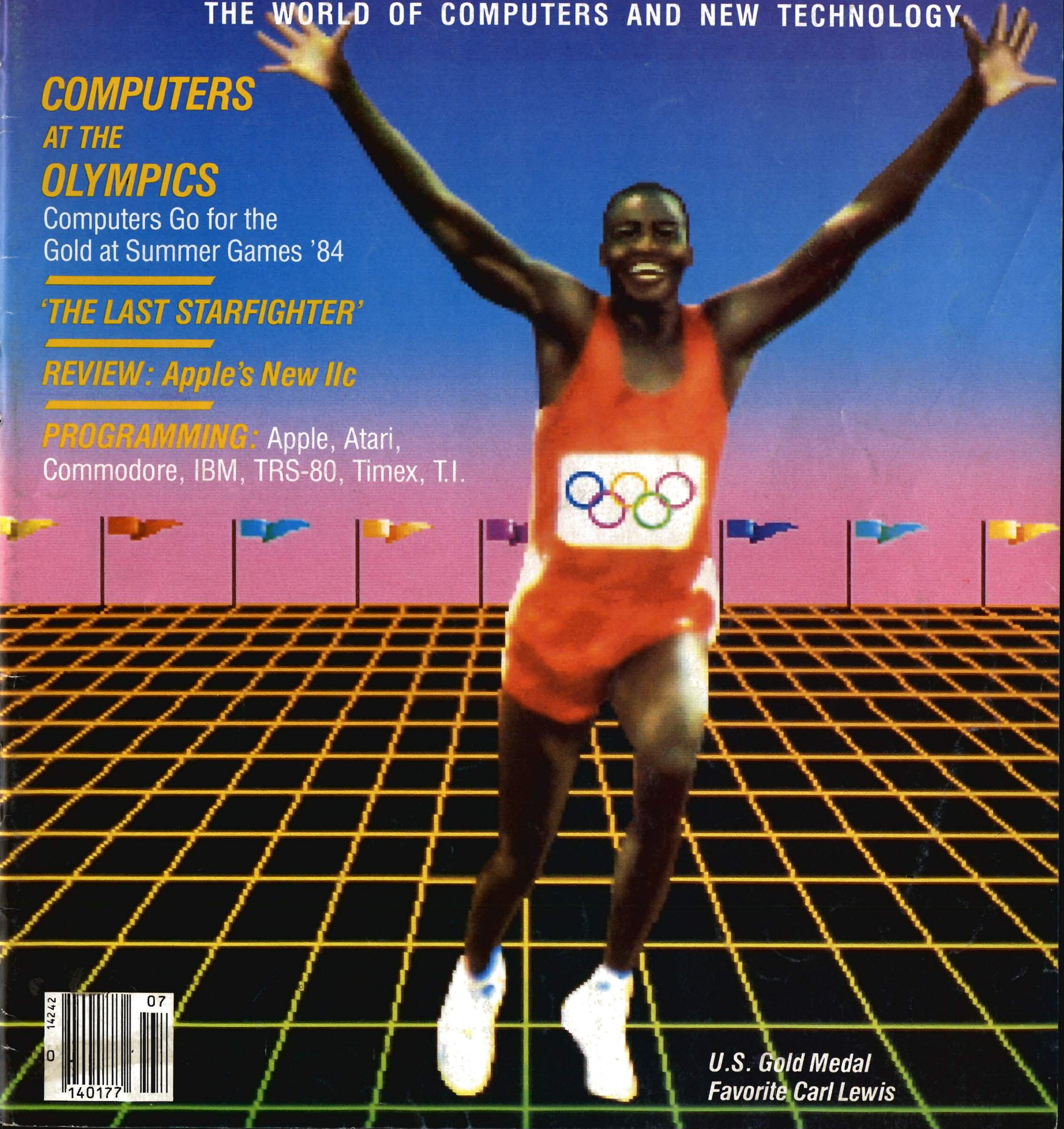

COMPUTERS AT THE OLYMPICS

Computers Go for the Gold at Summer Games '84

'THE LAST STARFIGHTER'

REVIEW: Apple's New IIc

PROGRAMMING: Apple, Atari, Commodore, IBM, TRS-80, Timex, T.I.

U.S. Gold Medal Favorite Carl Lewis

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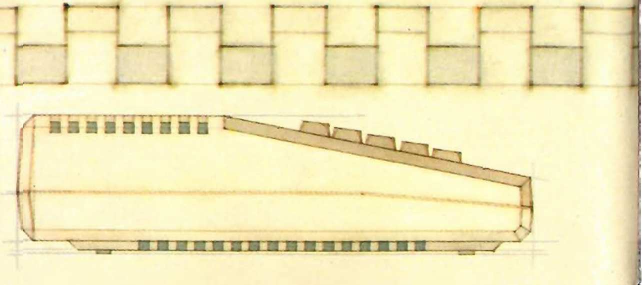

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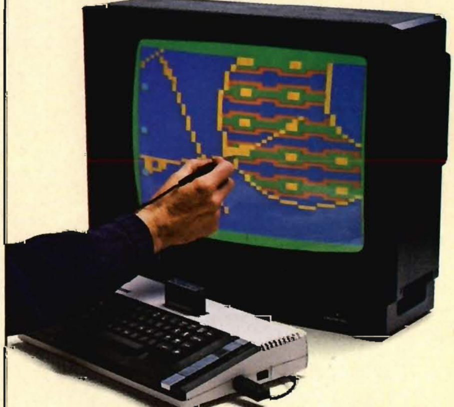

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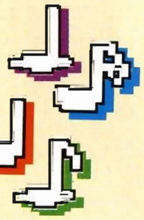

And if all that doesn't convince you that our new programs are a giant step beyond crayons, consider this: the kids will never write on the wall with a computer.

DISCOVER WHAT YOU AND ATARI CAN DO.

---

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MENU

JULY/AUGUST 1984

VOLUME 1, NUMBER 9

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Cover: Computer-generated background by National Imagemakers. Photo by Steven E. Sutton/Duomo.

INSIDE STORY

ENTER'S PRESIDENTIAL POLL

Computers can't shake hands, kiss babies, or make campaign speeches. But that hasn't stopped them from becoming very important in political campaigns. In this year's presidential election, computers are being used to make election projections, send out "personalized" fund-raising letters, tabulate poll results and much more.

We want to know exactly *how* micros and mainframes are affecting the election. In fact, we're working on a story about it for the November ENTER. And *we'd like your help.*

In this issue, you'll find a special ENTER Election postcard. It asks questions about *your* choice in the presidential election, and it won't cost you anything to mail. We don't want your name. Just tell us which candidate you'd vote for. Then answer a few other questions, like how big a town you come from, and what type of computer you use.

With a little help from *our* computer, we'll calculate your votes. We'll be able to show whether Atari owners tend to vote Republican or Democrat, and which issue Apple users think is most important. We'll tabulate TRS-80s and T.I.s, calculate Commodores, add up Adams, and include IBMs. And if you haven't got a computer at all—well, your vote counts just as much.

The results won't shake the nation politically. But we hope you can help us show how computers are affecting "The Making of the President, 1984."

All you need to take part in our digital debate is a pencil or pen. Remember, it won't cost you anything to mail in our ENTER Election card. So make your views known—vote!

Ira Wolfman

Ira Wolfman
Editor

enter™
VOL. 1, NO. 9, JULY/AUGUST 1984 © 1984

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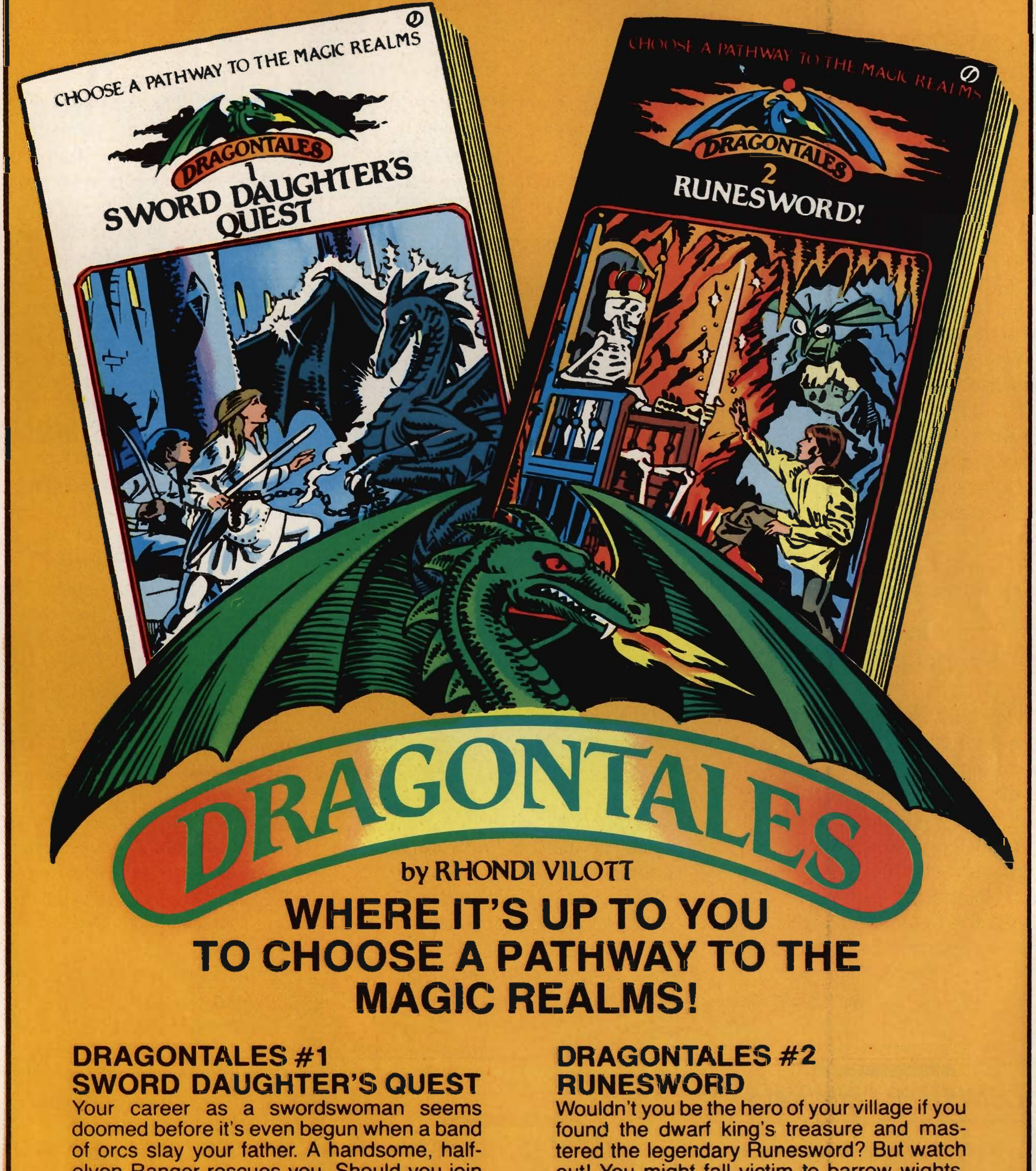
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SIGNET

FEEDBACK

COMPUTER BREAK-INS

In March, we told you the story of Paul, the youngest member of the 414s, a group of Milwaukee hackers who broke into other people's computers.

We asked ENTER readers to tell us what they thought about the computer break-in problem. One out of every ten readers responding to our *Input* poll said they knew someone who had gained access to a mainframe illegally. Some of you sent us letters about the break-ins. Here's what you had to say:

I WAS CAUGHT, TOO

I feel that what the 414s are doing is fully illegal. I know about computer crime. I was caught for computer piracy earlier this year. Fortunately, no charges were brought forth. I was really scared. However, I also feel that if they don't intend any harm, they should be befriended by the owner of the computer broken into (as "Going Straight" suggested).

—Brian S. Joseph
Fall River, MA

COMPUTER CRIMINALS

I disagree very strongly with the moral lesson taught in the article "Going Straight." Rewarding such criminals by hiring them to better protect your system is going to encourage that person's appetite for future computer thievery. However innocent it may seem to a teenager who just enjoys the "challenge" of breaking and entering computer systems illegally, no computer magazine—especially one geared for youth—should encourage this type of ethics. Our penitentiaries are full of people who sought after very similar "challenges."

—J. Robert Fox
Foley, MN

apple II
monitor ///

© HOWARD BERMAN

Dear Mr. Fox:

ENTER was not "encouraging" computer break-ins. The point of "Going Straight" was to show the serious consequences of computer break-ins. You may disagree with Geoffrey Goodfellow's tactics, but we all agree with his goal— to steer hackers "towards more constructive use of their talents." —*Ed.*

DETROIT BREAK-IN

I very much liked the exclusive Computer Break-In Report. I know a hacker in Detroit who got busted by the F.B.I. They called him "The Whiz." He broke into other computers (company mainframes) and messed up info. When the F.B.I. came to his house, he was still in school. His parents were in shock. The F.B.I. took everything—his computer, notes, programs. They won't give back his computer.

—Randy Pachnik
Detroit, MI

MAN vs. MACHINE

I liked your interview with the youngest 414, Paul. I don't think they should be charged with anything...it's like a challenge between man and machine. They only should be charged if they deleted something that's very important.

—Ron Anson
San Diego, CA

PAUL'S FUTURE

I hope you will tell what eventually happens to Paul in your future issues.

—Sean Sheldrake
Portland, OR

Dear Sean:

Paul is still waiting to hear what could happen to him.

Meanwhile, in March, two of the other 414s pleaded guilty to misdemeanor charges. They face a maximum penalty of a year in jail and $1,000 in fines.

Since the 414 incident, a number of states have passed tougher laws banning break-ins. Future offenders will face even greater penalties. —*Ed.*

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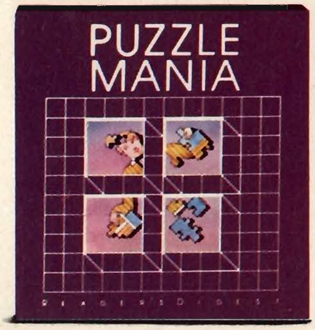

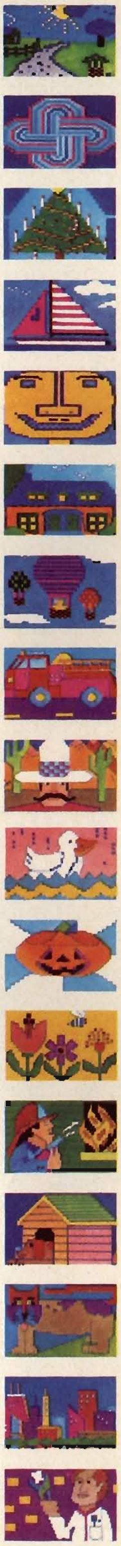

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Reader's Digest Software created Puzzle Mania for kids and their friends and their parents and their grandparents and everybody else who likes fun and games. Look for it at your software store or call Customer Service at 1-800-431-8800. (NY: 1-800-262-2627; AK, HI: 914-769-7000; Canada: 514-934-0751).

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BITS

DATA DATES

ILLUSTRATIONS © SANDRA HENDLER

The senior class at Billerca High School in Billerca, Massachusetts, has turned computer dating into a class act.

The seniors hired a computer dating service and had 1,600 students fill out special questionnaires. The dating service's computer took this data and produced a personalized list of 10 perfect classmate dates for each student. Each list sold for $1.50, and the seniors used the money to pay for a class trip.

And who said computers aren't romantic?

VOTERS BYTE BACK

Will a computer help elect our next president?

Probably. Most of the major candidates are using computer technology to take care of many campaign chores. Walter Mondale's campaign, for example, uses computers to keep track of the candidate's daily schedule, and to print out letters, press releases and address labels. *(And ENTER is taking its own presidential poll—see "Inside Story" for details.)*

But at least one election-year use of computers hasn't gotten many votes of approval. Ronald Reagan's campaign tried using a computer to dial phone numbers and have a computer-created voice ask a question. But before the question was done, half the 12,000 people being called cast *their* votes against computer voices.

They hung up.

PYRAMID COMPUTING

The Pharoah never had a PC, and the Sphinx never spent time in Silicon Valley, but now computers are helping us understand the language of the ancient Egyptians.

Until now, reproductions of these ancient texts had to be hand-drawn. That was because the Egyptians' complex alphabet symbols—known as *hieroglyphics*—could not be reproduced by a printer. Now, a word-processing program developed at Brown University lets scholars spell out hieroglyphics on the computer screen. This should make it easier to produce the first hieroglyphics dictionary.

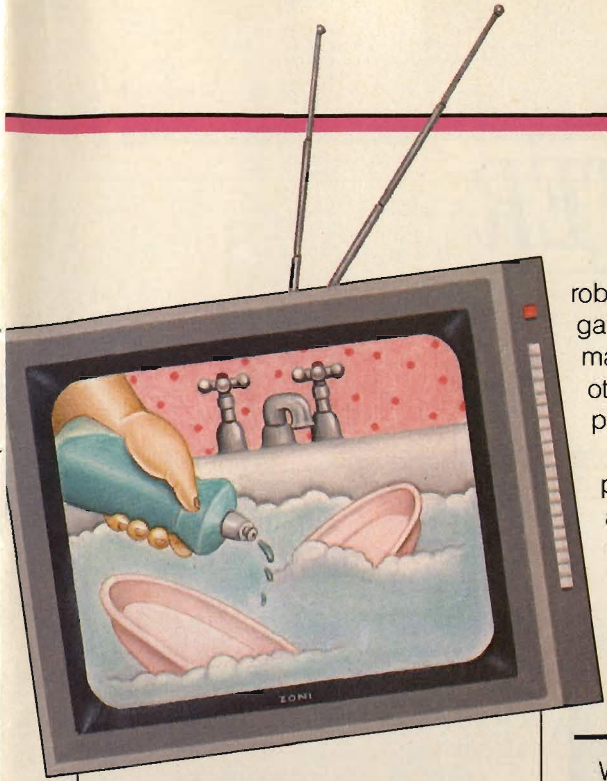
Computers may still be Greek to some people, but they are making Egyptologists smile all the way down the Nile.

SUGGESTION BOX

You're watching TV and suddenly you get the urge to do your homework.

Is this some kind of miracle (or nightmare)? No, but it does demonstrate the power of suggestion, and the power of a new program from The Stimultech Company of East Lansing, Michigan. Stimultech has developed a program, *Expando Vision*, that uses the power of suggestion—and a computer and TV—to give you personal pep talks. You plug *Expando Vision* into your Commodore or Atari computer. Every two minutes, it flashes a message on the TV screen for one-thirtieth of a second. The message can be something like "Study Hard" or "Exercise is Fun." You're not consciously aware of the message, but it puts the idea in your head.

Does this conjure up visions of mind control and *1984*? No problem, claims Stimultech's Wallace LaBenne. You see, he says, *you*

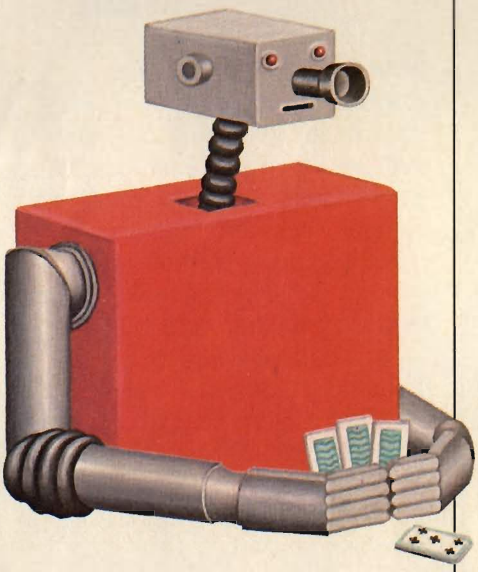


are making your own suggestions. And you'll *know* if your folks get hold of *Expando Vision*—you'll have a sudden urge to wash the dishes and take out the trash.

ROBOT ROULETTE

Rich the Robot wanted to take a gamble and work for a casino, but state officials told him "no dice."

Rich was hired by Resorts International, an Atlantic City casino, as a card dealer. But the state of New Jersey says this remote-controlled robot has to stay away from the gaming tables. Officials fear Rich may be rigged with cameras or other methods of sneaking a peek at players' hands.



The state's ruling has been appealed, but for now the mechanical cardsharp has to steer clear of betting. Maybe he can get a job as a bullet-proof bouncer?

WHAT'S IN A NAME?

We all know about computer languages like BASIC and Logo, but here's a brief guide to lesser-known languages with silly-sounding names.

Take JOVIAL, for instance. Is it a computer code for comedians? Not at all. JOVIAL stands for *J*ules' *O*wn *V*ersion of the *I*nternational *A*lgebraic *L*anguage. JOVIAL was created by Jules Schwartz to write air defense software.

Another lesser-known language, SMALLTALK, is *not* designed for computers that go to parties. It was developed for use by people who do visually-oriented work with their computer.

Finally, there's CLIO. A computer language for Egyptian princesses? Hardly. CLIO stand for *C*onversational *L*anguage *I*nquiry *O*ption and is for people who want to communicate with their computer in plain English.

Now *that's* a language we understand.

COMPUTERS ON ICE

Can you stop a hockey puck with a computer?

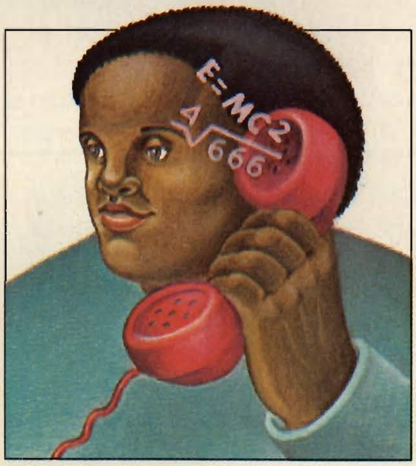
Rene Fradet, goalie with the Rensselaer Polytechnic Institute hockey team, thinks so. Fradet has written a computer program designed to teach goalies the best way to defend the net. On screen, the hockey rink is divided into sections. The program shows goalies how they must move to block shots.

Rene hopes it will help. But we suspect that hockey super-scorer Wayne Gretzky could find a way to outfox any computer.

DIAL-A-DRILL

You don't have to be a dentist to use Dial-A-Drill. But you do need pushbutton telephone.

Actually, Dial-A-Drill isn't for tooth work; it's for homework. The system was designed by Computer Curriculum Corp. of Palo Alto, California. It uses a computerized voice to quiz you about math or spelling. When you think you've got the answer, just press the right buttons on the phone. The computer keeps track of right and wrong answers.



Well, we still think it's better than dialing up a dentist's drill.

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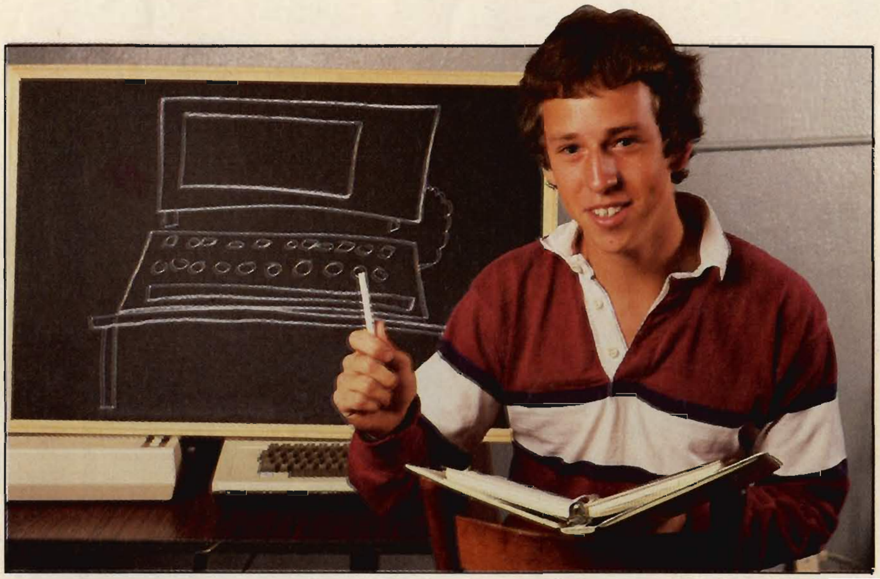
RANDOM ACCESS



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It's hard to say "no" to teachers—so *I* end up teaching *them* about computers.

TEACHER'S GUIDE

BY BEN KAUFMAN, 16

I know more about computers than many of my teachers do. That may *sound* great—after all, teachers generally respect "computer-smart" kids. But it's not quite that simple. I often find myself wishing I were just another student.

Frankly, it's not hard to be more computer-literate than most teachers. Many teachers today—with the exception of those who teach computer-related courses—know very little about computers. Some are even afraid of computers.

I've had a lot of computer experience. But at school, knowing about computers has created a a lot of work for me.

I find that teachers and kids often ask me for advice. That's not such a big deal. But once teachers realize how much the computer can help them, they expect *me* to teach them all about it. I end up spending lunchtime or free time after school helping a teacher with a problem or a program. It's not really my idea of fun—but it's hard to say "no" to a teacher.

And that's not the worst of it. There have been times when my computer know-how has put me in an awkward or embarrassing situation. Let me give you an example.

One day in math class, the teacher stopped her lesson and turned to me. "Ben," she said, "what do you think I should cover when we do computer math next week?" The whole class got very quiet. I knew that if I said something that resulted in lots of homework, I wouldn't be a favorite with my classmates.

I ended up telling her that I'd think about it, and talk to her after school. I must admit it felt good when she used my suggestions.

It's not just teachers who put me on the spot. Kids come to me for help, too. I usually don't mind. But I sometimes get the feeling that kids are just being lazy, and expect me to do all of their work. However, if I don't agree to help every kid with his or her homework, then I'm not a nice guy.

Occasionally, I come across confidential things on the computer—like the teachers' salary scale. These are things that I can't discuss with anyone—even my family or my best friend. If I did, I would lose my privileges on the computer.

Most of what I do isn't that interesting. For instance, I spent an entire week last summer typing a list of books and their authors into the computer for one of my teachers. It was boring, tedious work. When the list needs to be updated, I'll probably be asked to do it.

So it's really not as great as you might think. This summer, one of my teachers has asked me to write a few programs that will be used in science classes. I don't *have* to do them, but this is a teacher I'll have again next year—so I guess one of these days I'm going to sit down and write the programs for her. Wouldn't you? ⊡

BEN KAUFMAN lives in Riverdale, New York, and works on an Apple at home.

What do you have to say about computers? Write a short note to: Random Access, ENTER, 1 Lincoln Plaza, N.Y., N.Y. 10023.

USER VIEWS

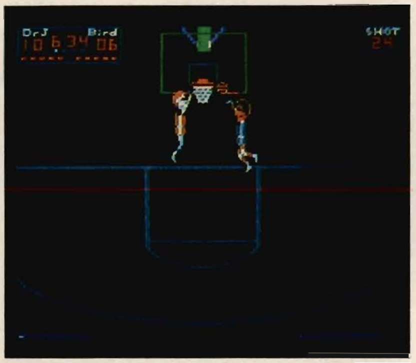
NEW COMPUTER GAMES

BY PHIL WISWELL AND BERNIE DEKOVEN

◆◆◆

ONE-ON-ONE

(Electronic Arts, Apple, $40.)



One-On-One is a superb translation of "street" basketball for one or two players. Your "team" consists of only one player—an animated version of Larry Bird or Julius Erving, the best basketball players in the world. If you choose Dr. J., your opponent (or the computer) plays as The Bird (and naturally, the reverse is true, too).

Dr. J. and The Bird actually teamed up with 18-year-old programmer Eric Hammond to create *One-On-One*. The players' NBA statistics were used to design the game. Shooting percentages from any point on the court, blocking abilities and speed have all been individually programmed for The Bird and Dr. J. which makes for a balanced game between two very different players.

Here's how it works. The screen displays half a basketball court. The player with the ball *must* dribble towards the basket and avoid the defensive player. Dribbling in place refreshes a player and improves his shooting, blocking and rebounding percentages. A press of the action button starts a jump shot; another press releases the ball towards the hoop.

One-On-One has many nice touches. The referee, for instance, will blow a whistle on fouls and give you free throws from the foul line. You also have a lot of control over player moves. When Larry Bird or Dr. J. is driving for the basket on the computer, the moves are close to what they could be in a real basketball game. This one-on-one game is a match-up made in basketball heaven.

WRAP-UP

BERNIE: The characters are nicely animated. It is a joy to watch them move on the court. And I loved the instant replay feature, which gives you a second look at a great play or a slam-dunk that shatters the backboard. I *did* find the referee's calls a bit too random. Still, the action looks wonderful.

PHIL: I think it's the faithfulness to the styles of two very different players that makes *One-On-One* such a great game.

The only drawback is that because most Apples only accommodate one joystick, defense must be played from the keyboard when two humans play. The game is best when you play against the computer.

◆◆◆

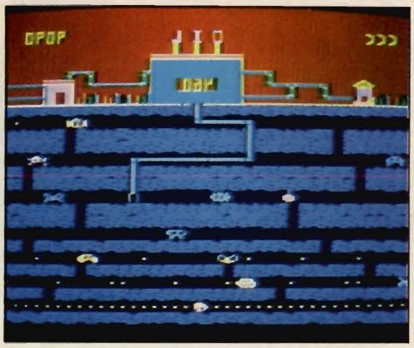
OIL'S WELL

(Sierra On-Line, Commodore 64, Apple, Atari, $29.95, $34.95 cartridge.)

ARDY THE AARDVARK

(Datamost, Apple, $29.95)

These are fast-paced, original games whose graphics and sound effects are good enough to make outstanding arcade challenges. But we thought it strange that they had so much in common. Who copied whom?



Oil's Well is a series of eight mazes filled with dots that represent oil pellets. Your object is to eliminate all the dots and move on to the next, more difficult maze. You control the movement of a drill bit that gobbles dots. But *you* don't roam the maze—the drill bit does. It's always attached by a pipeline to the starting point at the top of the maze. As your bit snakes its way through the maze, a trail of pipe is left behind. When you press the action button, the pipeline pulls back. Creatures and bombs move through the mazes in patterns that can't be memorized.

ASK ENTER

BY DAVID POWELL

VIDEO MIND CONTROL

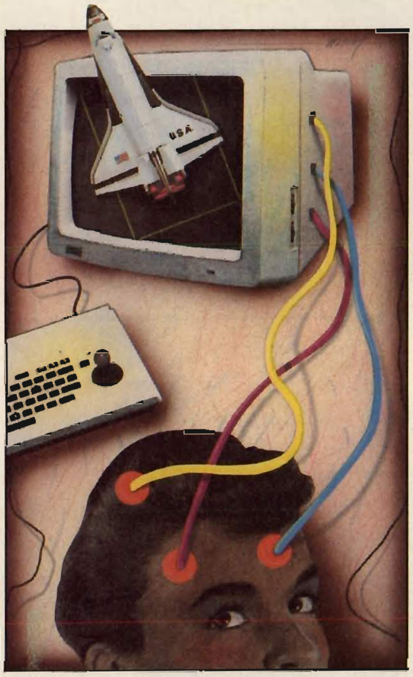
DEAR ENTER: Will there ever be video games that you can control with your mind? —Sam Atkinson

DEAR SAM: So far, no one has invented a computer that can read your thoughts. But computer scientists are experimenting now with all kinds of new technology that will link the human mind more directly to the computer.

At the Massachusetts Institute of Technology, researchers have developed sensors that tell a computer what you are looking at. Sensors also can be attached to your wrist, letting you signal the computer by pointing. This would eliminate the need to touch a computer in order to get information. For example, a surgeon could get information in the middle of an operation simply by pointing to a symbol on a computer screen.

Behavioral Engineering, a company in Santa Cruz, California, is about to release a game controller that monitors your body in ways similar to a lie detector. Called *MindReach*, the product is a round pad that plugs into your Apple, Commodore or Atari. When you place your hand on it, the pad senses changes in your skin's moisture. You can learn how to control these small amounts of moisture by changing your level of relaxation. This allows you to use the pad to play games.

So far, Behavioral has developed six games to use with this device. In one, you use the pad to raise a crashed spaceship out of a swamp, like Yoda in *The Empire Strikes Back*. The pad and three games will retail for around $75 and should be available soon.


© CARL WESLEY

INTELLIVISION ON TV

DEAR ENTER: I own an Intellivision system and would like to know why it can only be hooked up to a color TV. —Davie Maddox, Clinton, MS

DEAR DAVIE: Actually, both Intellivision I and II *can be* hooked up to a black-and-white TV. It's just the owner's manual says they can't.

According to Mattel, Intellivision's original manufacturer, this strange statement was made because some of the Intellivision games, like *Astromash*, display scoring information in color. This information would be lost on a black-and-white TV.

By now, you probably know that Mattel sold Intellivision this spring to a group of their executives.

You can still get your Intellivision serviced, however. Just check your warranty for the nearest service location.

You can also call Mattel at 800-421-2826 for the name of a service center near you.

BALLY WHY?

DEAR ENTER: Our family has a Bally computer [game] system, and we really enjoy all its games. But recently, there are no Bally cartridges to be found. Did Bally stop making cartridges? Why?

—Donny Pashayan,
Westlake, OH

DEAR DONNY: Yes, Bally has stopped making cartridges—but you *can* still get new ones. More than two years ago, Bally sold its Bally Professional Arcade line to a company called Astrocade.

You can buy—by mail—the 22 cartridges Astrocade makes. They range in price from $19 to $60.

For a catalog, write to:
Astrocade, 6460 Busch Blvd.,
Suite 215, Columbus, OH, 43229,
or call 614-885-0130.

DAVID B. POWELL *is an ENTER contributing editor.*

If you have a question about computers, just send it to: ASK ENTER, ENTER Magazine, CTW, 1 Lincoln Pl., NY, NY 10023.

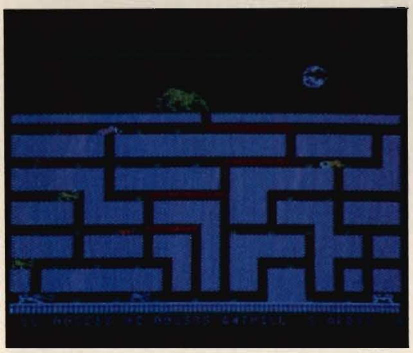
Your drill bit destroys the creatures, but the creatures destroy the pipeline that connects the drill bit to the top of the maze.

In *Ardy the Aardvark*, the object is identical to that in *Oil's Well*: eat all the dots (food pellets) in each maze, while avoiding or destroying pests and obstacles. Here, you are an aardvark gobbling up food pellets and the pests are ants and worms. Ants can be eaten with the tip of the tongue—but touch them with any other part of your tongue, and you lose a life. Worms can be eaten safely only from tail to head. Your aardvark's tongue lengthens as you move, and it retracts with the action button.

This is a much funnier theme for this kind of game. It's more fun to go after ants and worms than to search for oil.

WRAP-UP

BERNIE: These games are real strategy challenges: in order to reach your goal, you've got to risk everything.



It is always the foolish lust for points that undoes you.

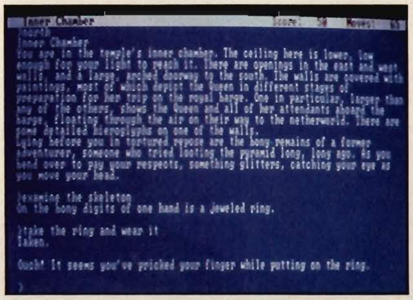
PHIL: I like *Oil's Well* because it's easy to control. The game drives like a Ferrari. *Ardy* is the same style game, but control is just not as good.

BERNIE: True. But the graphics animation and theme of *Ardy* is better. The game has a better sense of humor.

◆◆◆

INFIDEL

(Infocom, Commodore 64, Apple, Atari, IBM PC and PCjr, TRS-80 Models I and III, and others, $49.95)



```
Inner Chamber                              Score: 50    Moves: 65
>north
Inner Chamber
You are in the temple's inner chamber. The ceiling here is lower, low
enough for your light to reach it. There are openings in the east and west
walls, and a large, arched doorway to the south. The walls are covered with
paintings, most of which depict the Queen in different stages of
preparation for her trip on the royal barge. One in particular, larger than
any of the others, shows the Queen and all of her attendants aboard the
barge, floating through the air on their way to the netherworld. There are
some detailed hieroglyphs on one of the walls.
Lying before you in tortured repose are the bony remains of a former
adventurer, someone who tried looting the pyramid long, long ago. As you
bend over to pay your respects, something glitters, catching your eye as
you move your head.

>examine the skeleton
On the bony digits of one hand is a jeweled ring.

>take the ring and wear it
Taken.

Ouch! It seems you've pricked your finger while putting on the ring.

>
```

Infidel is an interactive text adventure that has everything you'd want—it's well-written, humorous, and difficult. But if you don't like reading stories, solving dilemmas and puzzling over what commands the computer will understand, *Infidel* may do nothing but frustrate you.

Infidel takes place in a desert encampment near the Nile river. You discover that your guide Abdul has left during the night, taking everything useful with him. Well, *almost* everything. If you look carefully and in the right places, you'll discover matches, a shovel, a pick axe, a knapsack with a canteen, a map and a bit of food.

Then it's off to the desert to dig in the sand for the top of a buried pyramid. Buried for centuries, this pyramid contains enough treasure to make Indiana Jones green with envy. *Infidel* comes with props, like a map, that can be helpful.

WRAP-UP

PHIL: This game is driving me loony. I know I'm nearing the end, but it keeps getting more difficult! The Egyptian desert setting is very well described, and that makes you feel you're really there.

BERNIE: *Infidel* is wonderful, especially the system that lets you type in full sentence commands, rather than just two word combinations like GO NORTH. However, once the mystery is solved, you probably won't want to play it again.

◆◆◆

SHAMUS: CASE II

(Synapse, Atari, Commodore, $34.95)

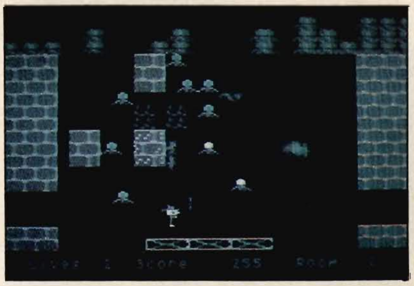
This sequel brings fresh play to treasure-seeking, maze/adventure games. You never know quite what to expect.

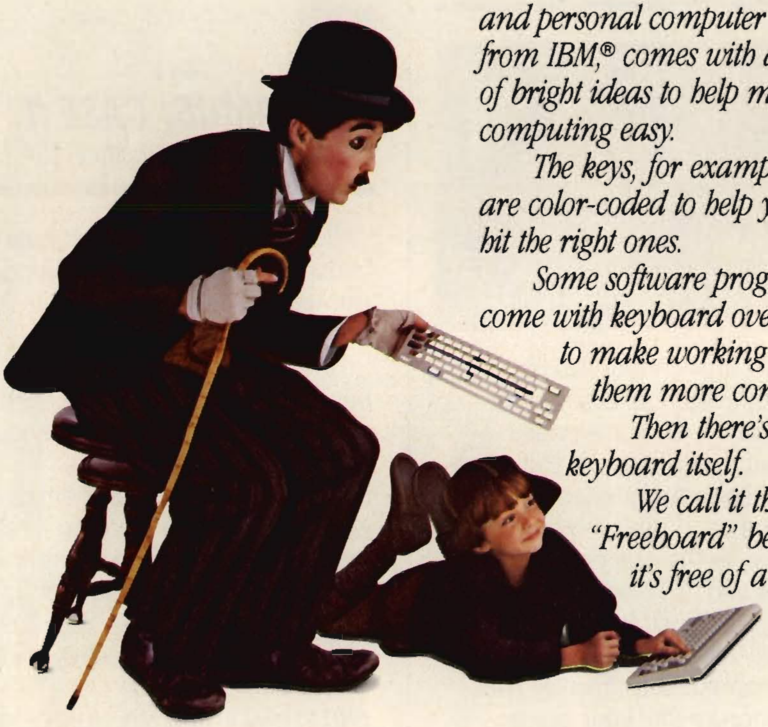
Rooms with ladders, pits and passageways contain snakes that roam across the screen at various speeds. You cannot kill the snakes, but must avoid them by waiting patiently on ladders until they pass. Other rooms contain enemy creatures that descend, firing at your character. You must hurl balls at them to destroy them.

WRAP-UP

PHIL: I love it! The structure of *Shamus: Case II*'s connecting rooms and the placement of its treasures are very clever, and provide a lot of good, dramatic tension for the player.

BERNIE: The best feature is the mapping. This *Shamus* is an interesting blend of different kinds of games. Unfortunately, too many moving things on the screen create confusion and make the game less coherent.





PCjr, the new family and personal computer from IBM,® comes with a lot of bright ideas to help make computing easy.

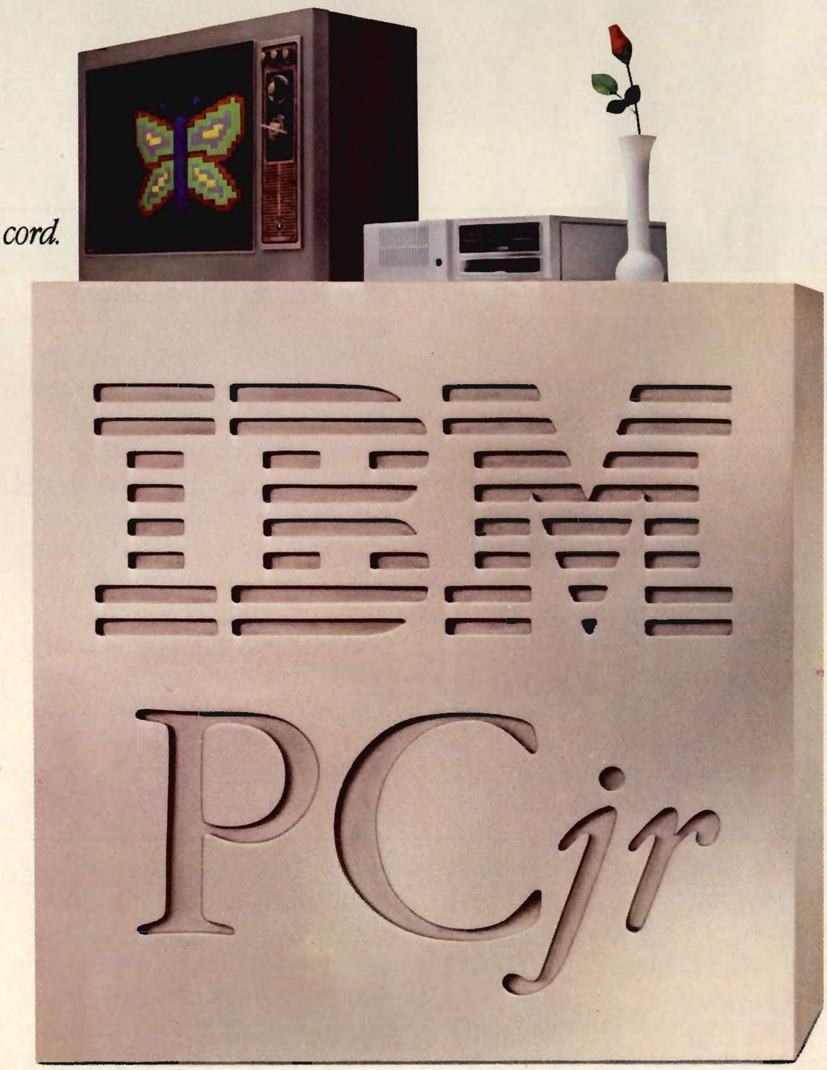
The keys, for example, are color-coded to help you hit the right ones.

Some software programs come with keyboard overlays to make working with them more convenient.

Then there's the keyboard itself.

We call it the IBM "Freeboard" because it's free of a...

connecting cord.



Little Tramp character licensed by Bubbles Inc., s.a.

NEWS BEAT

EDITED BY RICHARD CHEVAT

SMALL PORTABLES: BIG NEWS

The new Olivetti M-10 portable computer features a tilt-up screen

Portable computers are suddenly the newest fad in the computer industry. Every company is introducing a new computer and calling it "portable," whether it's a small notebook-sized model or a full-sized PC with a handle on it.

Olivetti introduced a new notebook-sized computer this spring, called the M-10. It will be priced around $700, and will compete directly with the popular Radio Shack model 100 and the NEC 8200. This is not surprising, since all three computers are made in the same factory in Japan. The M-10 does have one new feature—a tilt-up screen—and, like the Model 100, it comes with a built-in modem.

We can expect to see even more notebook, or lap-sized, portables in the future. One company developing a new product is Kaypro, which already makes a popular portable the size of a large suitcase. They are working with Mitsui, a Japanese manufacturer,on a machine that is a cross between a notebook-sized computer and a desk-top model. It will have two parts: a base that will hold the disk drives and a full-size monitor, and a detachable notebook computer with its own flat screen.

Meanwhile, Apple is introducing a new, portable version of the IIe (see our sneak preview in this issue). And, as we reported last month, IBM recently introduced a portable version of the IBM PC. Even the Macintosh, at 20 pounds, is advertised as portable, since it comes with a carrying case.

What's next? Wristwatch computers? Matchbook-sized computers? How about inflatable models that you can fold up and put in your pocket? We're waiting for the ultimate portable, the one that carries you, instead of the other way around.

RELAXING SOFTWARE: Now you can use your face as a joystick. May sound crazy, but if you want to try it, check out *Relax* by Synapse.

Relax is a hardware and software package in one. The program includes an electromyograph (EMG, the device that monitors internal electrical impulses), a headband, and an audio cassette tape with soothing sounds of the ocean, birds and music.

"You use muscle tension to control certain games. The game shows tensions that you're unaware of," designer Ihor Wolosenko explains. And, Ihor says, you can play games such as *Pong*, *Breakout*, and *Space Invaders* with the package. So, let your smile be your joystick.

However, all this relaxation doesn't come cheaply. *Relax* costs $99.95 for Commodore 64 and Atari and $149.95 for Apple and IBM PC, PC*jr*.

AWAY FROM HOME: Even computer games deserve a chance to get away. In a very unusual move, four First Star Software games are going into the arcades *after* they've been made available as home games. Exidy, a coin-op video game manufacturer, and First Star have started putting First Star's home games *Boulder Dash*, *Astro Chase*, *Bristles*, and *Flip and Flop* into arcades around the U.S.

"We've done it in reverse," admits Diane Loomis of First Star. "Usually games are in the arcade and then go into the home." Besides joining the arcade world, *Boulder Dash* has recently been converted for the Commodore 64 and IBM PC/PC*jr*.

MAC AND PC GO TO SCHOOL: Apple and IBM have both decided that the sooner you get your hands on one of their computers, the better it will be for them. So both companies, who are competing more closely than ever before, have launched programs to get to you while you're still in school.

When Apple launched the Macintosh this February, it also launched the Apple University Consortium. Twenty-four major universities, including Princeton, Stanford, and the University of Chicago, have joined the group so far, which allows faculty and students to buy Macs at a hefty discount. In return, the universities each agreed to buy 2 million dollars worth of Apple equipment over three years. They also agreed to develop instructional software for Apple computers.

IBM, which has had similar deals with colleges in the past, is not allowing Apple to go unchallenged. They also have discount and research arrangements with colleges.

And IBM is aiming even younger. Recently, they announced plans to donate 12 million dollars worth of PC and PC *jr.'s* to high schools and elementary schools across the country.

ENTER MAKES NEWS(PAPERS): STOP THE PRESSES!! The latest EXTRA in newspapers across the country is a syndicated column brought to you by none other than ENTER Magazine. Since last April, ENTER Syndicated has appeared up to four times a week in a format created especially for daily and Sunday papers.

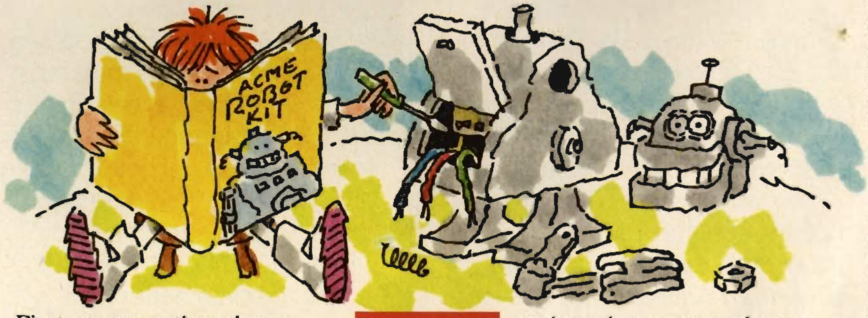
The material comes from the ENTER staff. Among the column's regular features are: Programs, Blips, Bits, Ask ENTER, pencil crunchers, quizzes and flowcharts.

ENTER Syndication is sold by the Tribune Company Syndicate, Inc. and comes in two versions: full-color for Sunday comic sections, and a black and white version with enough material to run three times a week.

The syndicated column is already in over 25 city newspapers across the U. S., including The *Chicago Tribune*, *Philadelphia Inquirer*, *San Jose Mercury*, *New York Daily News*, The *Detroit Free Press*, *Denver Post*, and *Tampa Tribune*. Others are expected to sign up soon. Watch your local newspaper: ENTER may be coming to *your* town.

NEWSBITS: Now Commodore is getting into the IBM-compatibles business. They recently signed an agreement with the Intel Corporation that will allow Commodore to manufacture the same chip that runs the IBM PC. One of the IBM compatible machines they are planning to produce will be very similar to the Hyperion, a suitcase-sized portable......

HOW TO MAKE FRIENDS ON OTHER PLANETS



First, go to another planet. (That's easy if you're traveling through space in PLANETFALL*, the great science fiction comedy from Infocom's interactive fiction line.)

PLANETFALL

Next, find a robot nobody's using. Then, to make him start up, type in your command: TURN ON THE MULTIPLE PURPOSE ROBOT... You've just made a robot friend who'll follow you anywhere.

And you'll be glad you have a faithful follower—there's no telling what will happen next in PLANETFALL. Because, like all of Infocom's interactive fiction, PLANETFALL's designed so that whatever *you* choose to do affects what will happen next. And there'll be plenty happening—it's an adventure filled with everything from dread diseases to mutant monsters, and it can last for weeks or even months.

Get the closest thing on a disk to really going into outer space. Get PLANETFALL*. It's not just a great adventure—it's a great way to make friends!

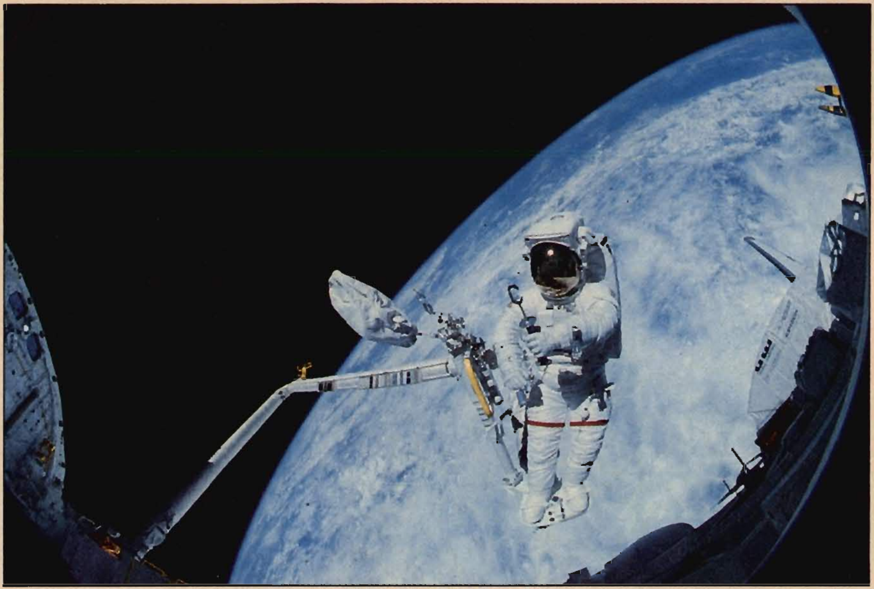
INFOCOM™

*It's compatible with almost every popular home computer. PLANETFALL is a trademark of Infocom, Inc.

SHOW BEAT

EDITED BY PATRICIA BERRY

'SHUTTLE' FLIES INTO FILM


COURTESY OF CINEMA-360, INC.

The spectacular 'Space Shuttle' film: Astronauts make a movie.

It's hard to imagine a space movie without *Star Wars*-style alien life forms, *The Right Stuff*-type special effect photography, and *The Last Starfighter* brand of computer animation.

But, as the song goes, there's nothing like the real thing. Well, it's arrived. ***Space Shuttle: An American Adventure*** is due for release this fall. This 30-minute film documents the last three voyages—in February, April and June—of the National Aeronautics and Space Administration's (NASA) space shuttle Challenger. And if the final film is anything like the previews, you'll swear you're in flight.

Unfortunately, not everyone will be able to see *Space Shuttle* the way it was meant to be viewed. This documentary was filmed using fish-eye (wide angle) lenses, and the best way to see it is on a planetarium's rounded dome. The dome allows you to use your peripheral vision and seems to wrap the action around you. You'll feel like you're right there. According to the film's director, Dr. Richard Knapp, the results are even better than expected. "As a crewman floats past or tumbles in front of me, I almost want to step back and give him more room," he said recently.

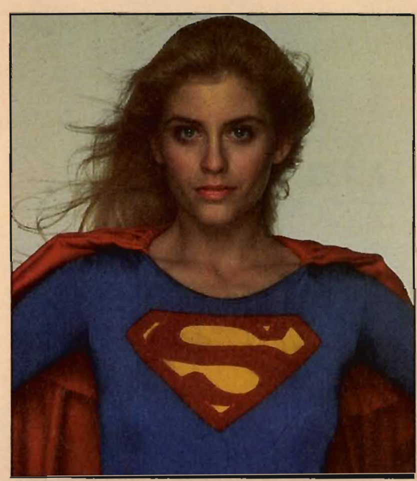
Most of the footage of *Space Shuttle* was shot in flight by the astronauts themselves. It includes mundane scenes—like in-cabin exercising and weightless playing around—and highly dramatic ones—like Dr. Bruce McCandless' untethered walk in space, the first ever. There'll also be footage of Dr. George Nelson's April flight efforts to retrieve and repair Solar Max, the broken satellite observatory launched in 1980.

Every movie has a scene stealer, and *Space Shuttle* is no exception. According to Dr. Knapp, who is also director of the Davis Planetarium in Jackson, Mississippi, the eye-grabber in *Space Shuttle* will hit pretty close to home. In fact, it *is* home: it's Earth.

Cinema-360, the non-profit organization sponsoring *Space Shuttle*, is actually a group of six planetariums which will air the film first. Before long, though, the reels will be converted to 16 mm film and video tape for flat screens and television. If you live in or near Jackson, MS, Tucson, AZ, Reno, NV, River Grove, IL, Cocoa, FL, or Fort Myers, FL, you're in for a treat. *Space Shuttle: An American Adventure* will be showing in planetariums in those towns starting this fall.

For more information write:
Cinema-360, Inc., c/o Russell Davis Planetarium, P.O. Box 288, Jackson, MS 39205.

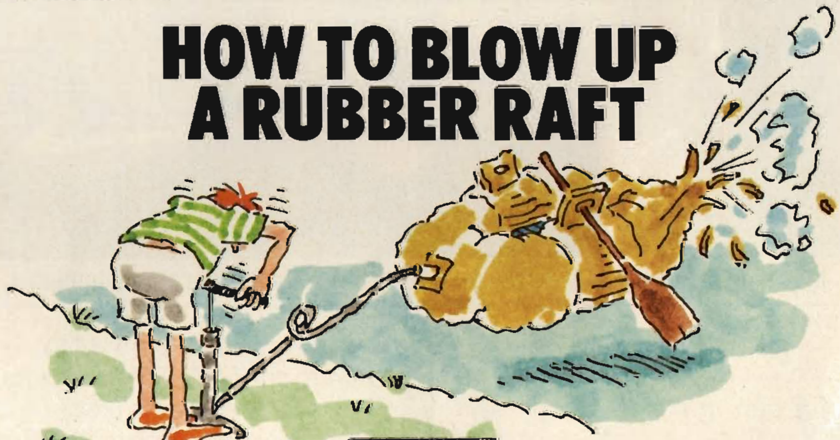
BROADWAY BITS: High-tech trends are getting big parts on and off-off Broadway. ***Hackers*** is a full-length play about a super-smart college student who wants to amaze his professors with a program that "thinks." *Hackers* had a short off-off Broadway run last spring, and some producers have expressed interest in helping it make the big time. *Hackers* was written by programmer Mike Eisenberg, who is currently furthering the cause of hacker-dom as a graduate student at MIT. An ENTER sidelight: *Hackers'* hero is named Martin DeKoven—in honor of ENTER's own reviewer, **Bernie DeKoven**, whom Mike Eisenberg met while working on a Children's TV Workshop computer project...Art "personality" **Andy Warhol** has always been a little ahead of his time. But **A2W2,** a robot that looks like Warhol (he's a little man with shaggy silver hair), talks like Warhol (he has a slight stutter), and acts like Warhol, will edge him out by a microchip. And he—or it—will do all this on the Broadway stage this fall. AVG Productions of Valencia, California, is building the $400,000 robot whose face and hands will be covered with flexible skinlike material. The show will consist of a half-hour monologue, followed by a question and answer period involving the audience. One thing's certain: it's going to be a tough act to follow!


© D.C. COMICS INC., 1983

***Supergirl* does not compute.**

MOVIE NEWS: It's hard enough to turn a novel into a movie, but when the director works in Los Angeles and the screenwriter lives in Sri Lanka, the phone just isn't the next best thing to being there. So director Peter Hyams and science fiction writer/screenwriter **Arthur C. Clarke** turned to a computer. All of the script changes in ***2010***, the upcoming sequel to ***2001: A Space Odyssey,*** were made via a trans-oceanic computer link-up.... With one game and a sequel already out, what more can **Dirk the Daring** do? Hollywood, here he comes. That animated star of the laser arcade game ***Dragon's Lair*** and its sequel ***Time Warp*** will take to the screen in a feature-length Don Bluth production that should already be in the works. Stay tuned for release dates....Sequels are the name of the game these days for space and futuristic fantasy films that feature computerized special effects. But can microchips really be expected to counteract the murderous radiation rays that slew Mr. Spock in ***The Wrath of Kahn?*** See for yourself when Paramount Pictures' ***Star Trek III: The Search for Spock*** makes an appearance June 1. Speaking of sequels, the high-flying ***Supergirl*** from Warner Brothers is due out July 13. Oddly enough, computers were *not* a big part of the effects-laden production. One reason may be the way the film's visual effects supervisor, Derek Meddings, feels about computers. "I hate them," says Meddings. "When you open them up and look inside you don't recognize anything." He doesn't know what he's missing.

HOW TO BLOW UP A RUBBER RAFT



Your greatest challenge lies ahead and downwards.
ZORK I
INFOCOM

First, you need a reason to use a rubber raft. (That's a snap if you've got ZORK* I, the classic fantasy story from Infocom's interactive fiction line. Because you'll be hunting twenty fabulous treasures while dodging every kind of evil under the earth.)

Next, type in your command: BLOW UP THE RUBBER RAFT WITH THE AIR PUMP... But watch it, or you might just blow up the raft until you blow yourself to smithereens!

There's no telling what will happen next in ZORK I—because, like all of Infocom's interactive fiction, ZORK's designed so that whatever *you* choose to do makes the next thing happen. And you won't run out of things to do, either. The underground empire of ZORK is so huge, your adventure can last for weeks or even months.

So if you want the closest thing on a disk to really exploring an underground world, get ZORK I*. But brace yourself for the action—it'll blow you away!

INFOCOM™

*It's compatible with almost every popular home computer.
ZORK is a registered trademark of Infocom, Inc.

PACESETTERS

EDITED BY ELIZABETH HETTICH

COMPUTER COMPOSER

Keyboard Virtuoso: Will Harvey makes beautiful music...on his computer.

© DOUG MENUEZ

BY SUSAN MEYERS

When he was 12, Will Harvey didn't know anything about computers or music. Today, at 17, he is the author of a best-selling computer music program, *Music Construction Set.*

Will bought his first computer—a Commodore PET—five years ago, with money he earned from his paper route. "I didn't know anything about computers," he remembers. "I just wanted a computer back then because it looked like fun."

By reading books and experimenting, Will taught himself to program on his PET. After a couple of years, he decided to move on to an Apple IIe, the machine he uses today.

Will lives with his mother, father and younger brother, Ben, in Foster City, California. He got started on *Music Construction Set (MCS)* because he wanted to add music to a computer game (called *Lancaster*) that he had been working on for over a year. "Later, I saw that a music program had a lot of potential," Will explains. "But to begin with, I was adding the music just for myself."

Will's aim with *MCS* was to create a program that someone who knew nothing about music could use and have fun with. First, however, he had to teach *himself* about music. He did this by studying basic music texts and learning about flats and sharps, chords and tempos.

After about three months of programming—sandwiched between homework, football, and "movies and stuff"—Will met game designer Bill Budge. "I knew his work and admired it. His *Pinball Construction Set* had just come out and, though I hadn't seen it, I had heard about it," Will remembers. "I was the first person to ever ask him for his autograph, and then I told him about my program and asked if I could show it to him."

Budge was impressed. He introduced Will and his program to Trip Hawkins, president of Electronic Arts, the software company that published *Pinball Construction Set.* Hawkins liked Will's idea. "That's when I really started to get excited," Will recalls, "because I realized that my idea for a music program might go really far."

Will started expanding his program into a tool that serious composers, as well as amateurs, could use. "We—the people at Electronic Arts and I—talked to professional musicians. We asked them what they would need to find a program like this useful," Will says. "Then we incorporated those functions.

"In the process of perfecting *MCS*, I developed my own style of programming," Will explains. "I'm very happy and confident with it. *MCS* has the whole spectrum of programming styles, since my skill was just developing. It has some programming that's unstylish, but it still works and then it has some really nice stylish programming."

In its final form, *MCS* is both easy and fun to use. Users control the program with a joystick that directs the action of a hand on the screen. The hand picks up notes and other musical symbols displayed in the lower left corner of the screen. Then it places these symbols on two staffs—the lines on which music is written. The hand also activates other parts of the program—scrolling the musical score, changing keys, and moving whole bars from one place to another.

Ten pieces of music, ranging from classical to rock, are built into *MCS*. These can be played, and then played with. They can be sped up or slowed down. Notes can be added, the key can be changed, and bars can be rearranged.

"It's sort of like having a statue by Michelangelo and being allowed to chip away at it with a hammer and chisel," Will says. "You get to learn how music really works."

MCS has brought Will both fame and fortune. The week his program came out , he was written up in *Time* magazine.

But besides making a name for himself, and lots of money, working on *Music Construction Set* taught Will some of the ins and outs of game design. And now he's applying what he learned to a new game. "It's really top secret and I can't tell about it until it's done," he says.

Though Will plans to continue writing new programs, he's not sure he wants to make a career out of working with computers. He'll be a freshman in college in the fall, but he says, "I'm definitely not going to major in computer science. I'm doing what I want to do with computers right now. In college, I want to explore other fields that could be fun, too."

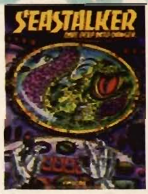
Will's family has found that having a talented programmer around the house is very handy. He designed a program that keeps track of grades for his mother, a college professor. And for his brother Ben, Will worked out a program to help organize his baseball card collection. He hasn't done a program for his dad yet, but he has his eye on the family dog, a giant sized Great Pyranees named Itsabear.

"I have to walk her and clean up after her," he groans. "Now, if I could just figure out how to make a program to do that....!"

SUSAN MEYERS is ENTER's west coast editor.

WILL HARVEY'S
MUSIC
CONSTRUCTION SET
YOU MAY BE AN UNHERALDED MUSICAL GENIUS

COURTESY OF ELECTRONIC ARTS



HOW TO FEED A SEA MONSTER

First, locate a sea monster. (The best place to find one is in SEASTALKER,™ the brand-new undersea story from Infocom's interactive fiction line.)

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There's no telling what will happen next in SEASTALKER. Because, like all of Infocom's interactive fiction, SEASTALKER's designed so that what happens next depends on what *you* decide to do. And you'll be doing plenty, too—your voyage can last for weeks or even months.

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CONNECTIONS

EDITED BY SUSAN JARRELL

Win A Camp Scholarship!

Computer Tutor Camps is offering some lucky ENTER reader a two-week scholarship to one of their sleep-away camps. The camps—there are four nationwide—feature IBM PC*jr* and Apple IIe computers. Campers can take 30 hours of hands-on instruction in BASIC, Logo, Pascal, Word Processing and many other subjects.

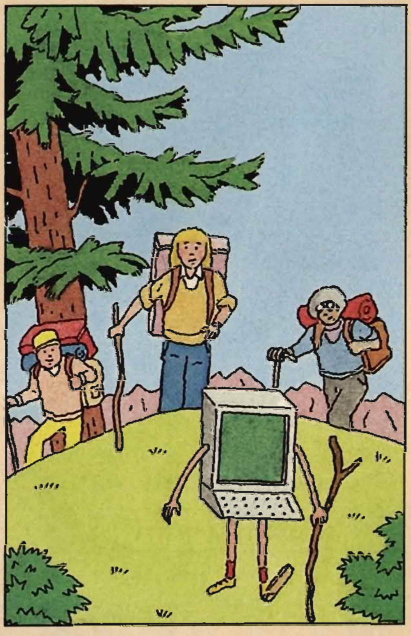
Computer Tutor Camps are located in Williamstown, Massachusetts; Swarthmore, Pennsylvania; and Stanford and Woodside Priory, California.

You can win the two-week scholarship to any of these camps for the summer of 1984 or 1985. Send your name to Computer Tutor Camps, 980 Magnolia Avenue, Larkspur, California 94939, by July 15, 1984. One winner will be randomly chosen; Computer Tutor Camps will let you know by July 31.

Your Secret Computer Weapon

You're wasting a precious resource. It sits in a classroom at school, unused, when it could be helping your team or club.

What is it? What else? Your school's computer! As Elliott Masie and Michelle Stein point out in their book, *Using Computers in High School Student Activities*, the school computer can be a very helpful tool.


© KURT VARGO

This is a no-frills, black and white, 105-page book. But it's filled with good ideas. Some examples:

- School newspapers can use the computer as a word processor to write, edit and even help typeset the paper.
- Drama clubs can write and rewrite scripts and print tickets on the computer.
- Student government can use a simple spreadsheet program to figure out budgets.
- Athletic teams can use database software to set up personalized training programs, and keep player statistics on the computer.

That's just a quick sample. There's a lot more food for thought in these pages. *Using Computers in Student Activities* is printed by the Adirondack Press. If you'd like a copy, send $14.20 (12.95 plus 1.25 shipping and handling) to National Student Leadership Center, Box 742e, Fox Pavillion, Jenkintown, PA 19046.

Bulletin Board Talk

Interested in computer bulletin boards? For $2, you can get "The National Computer Bulletin Board Directory," listing over 1400 bulletin boards across the U.S.

The bulletin board listings are arranged by area code and "the majority of the boards are free," says editor Thomas Wnorowski.

For a copy, send $2 to Thomas Wnorowski, 3352 Chelsea Circle, Ann Arbor, MI 48104.

P.S. If you're a BB system operator, Wnorowski says he will list your board free. Write him a note with the board's phone number, area code, type, hours of operation, baud rate used and type of computer.

S.A.T. Contest

If you've taken the SATs twice and used Krell Software's College Board SAT Prep Series, you might be eligible for the Krell SAT contest. Awards will be given to 34 students, including SAT high scorers and most improved scorers. Winners will receive hundreds of dollars of computer equipment.

If you're interested, you'd better hurry—the contest ends August 31. Send a photocopy of your SAT transcripts and proof of Krell program purchase to SAT Contest, Krell Software, 1320 Stonybrook Road, Stony Brook, NY 11790.

To list news, resources or contests in this column, write to: "Connections," ENTER, 1 Lincoln Plaza, NY, NY 10023.

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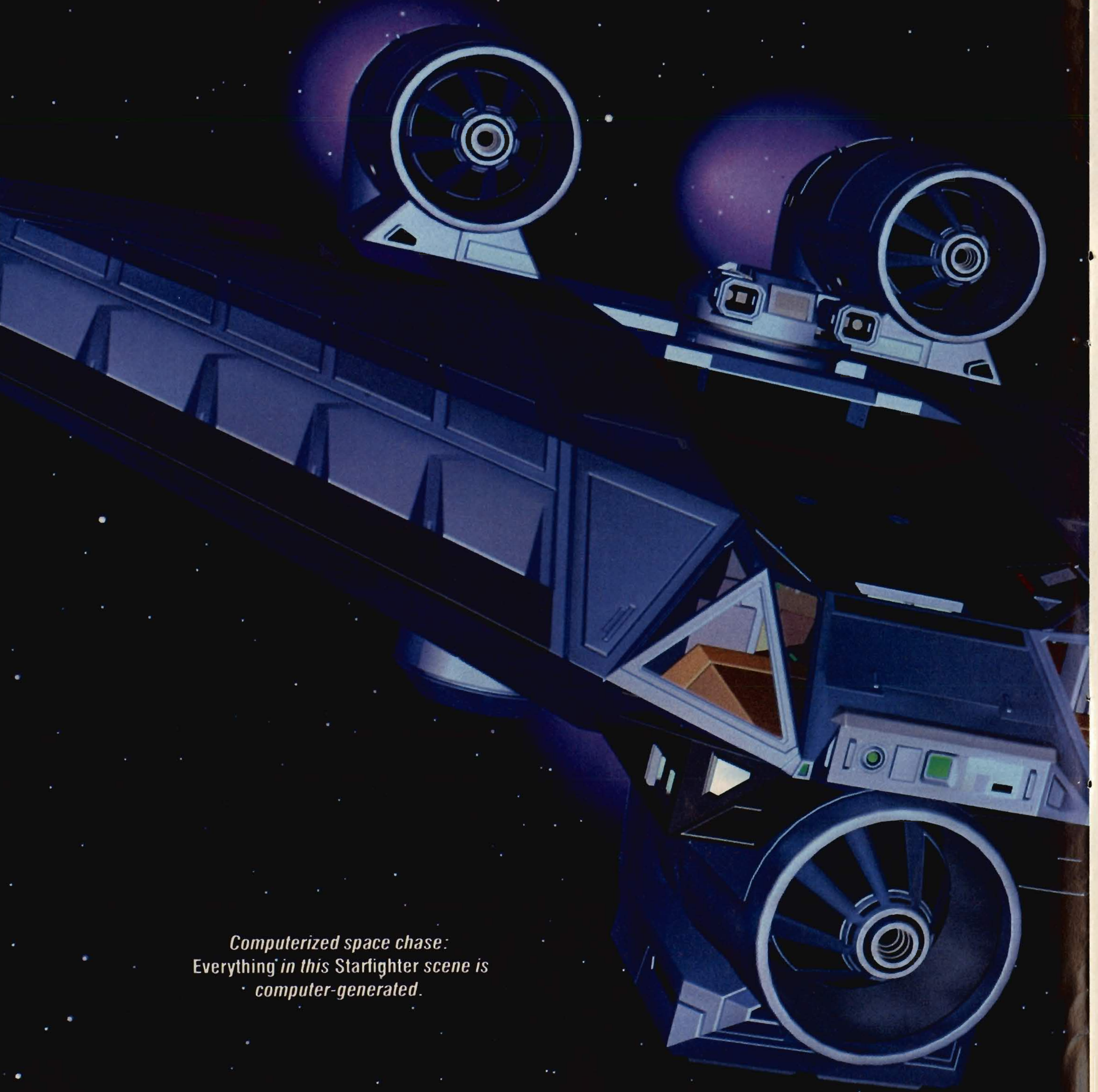
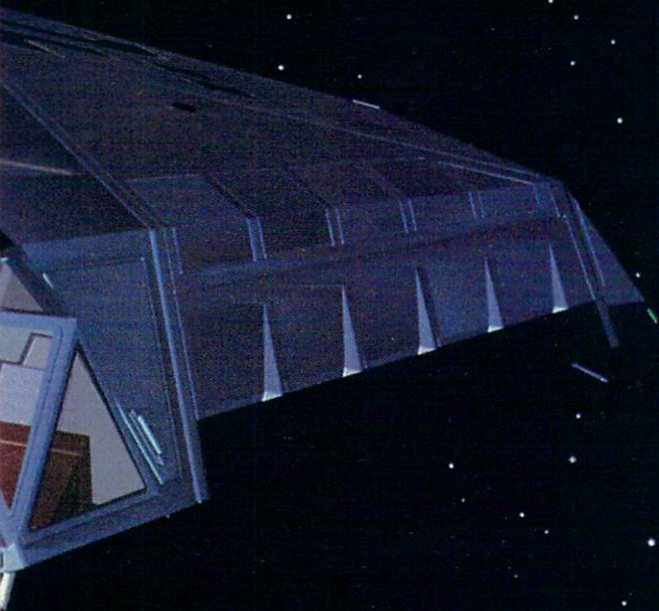
THE LAST STARFIGHTER



Computerized space chase: Everything *in this* Starfighter *scene is computer-generated.*



A SUPERCOMPUTER CREATION

BY GREGG KILDAY

Eighteen-year-old Alex skillfully pilots his intergalactic plane through a star-filled sky. As he searches the horizon for enemy crafts, meteors and planets zoom past in a blur.

Suddenly, an alien ship rockets into view. The helmeted pilot dives down on Alex's space ship, firing away. Is there time to return fire...or escape?

That scene from Lorimar Productions' new film, *The Last Starfighter,* may sound like the battle segments in other science fiction movies, but there's a major difference. The planets, stars—and even the helmeted enemy pilot— in *this* scene aren't really there. They're computer-generated, brought to the screen by Digital Productions, a special effects company in Los Angeles.

Starfighter isn't just a showcase for special effects, of course. It's a fantastic story of "a kid who discovers that the video game he's been playing is really a flight simulator being used to test people to do battle in outer space," says the film's director, Nick Castle, Jr. "It offers Alex, a real kid, the opportunity to be Luke Skywalker."

Alex's adventures are accompanied by approximately 25 minutes of computer animation. Produced by Digital at a cost of more than $2 million, these 25 minutes mark a major advance in computer graphics in movies.

THE SUPERCOMPUTER STRIKES BACK

The machine that makes this wizardry possible is the powerful Cray X-MP supercomputer. This $11-million computer, manufactured by Cray Research of Minneapolis, is packed with 240,000 silicon chips. It weighs 8.5 tons, and can perform as many as one *billion* computations per second.

The Cray, which requires more than 100,000 watts of power, sits in a special environmentally-controlled room at Digital's offices. Because the computer's 36 electric power lines generate so much heat, a 100-ton water chiller sits nearby to cool it down.

Digital Productions uses the Cray mainly for the complex calculations necessary to create photo-real computer art. Digital is the first company to prove that a giant computer can also function as a movie director. The only other Cray computers in existence are used for military and industrial applications.

Starfighter isn't the first movie to experiment with computer graphics, however. *Tron,* which came out in the summer of 1982, mixed computer-generated images with conventional animation and live-action photography.

Starfighter takes a major step beyond *Tron. Starfighter* features whole sequences created *entirely* on computer. "*Tron* was about a world that was meant to look computer-generated," observes

DIGITAL SCENE SIMULATION™ BY DIGITAL PRODUCTIONS. © 1984

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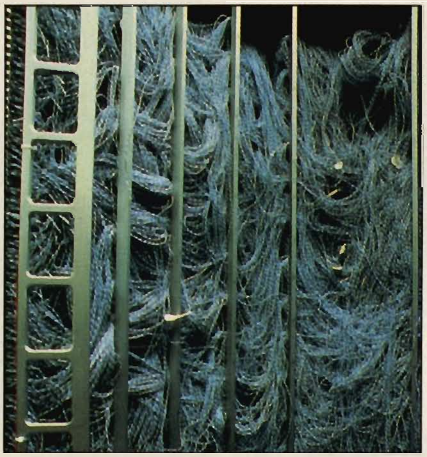
LEFT: ***A Cray self-portrait in raster graphics.*** *BELOW:* ***The complex wiring inside the real computer.***



COURTESY OF CRAY RESEARCH, INC.

'Starfighter *isn't* just a showcase for special effects. It offers a real kid the opportunity to be Luke Skywalker.'

John Whitney, Jr., Digital's president. "Our intent [with *Starfighter*] is to make *all* of it look like live action on the screen. The computer is not limited to the laws of the physical world....It's like being in space yourself, being free from gravity."

Whitney, 38, comes from a special-effects family. His father, John, Sr., invented a form of computerized camera control. When John went to work with his father, they dreamed of harnessing the power of the computer to do even more spectacular things.

John, Jr. joined up with computer programmer and Cal Tech graduate Gary Demos in 1974. They worked at Information International, collaborating on award-winning computer-graphic effects for movies like *Westworld* and *Futureworld.* They left in 1982 to form their own company, Digital Productions.

To create a convincingly spectacular world for *Starfighter,* Whitney and Demos called on designer and artist Ron Cobb. Cobb had created designs for *Alien* and *Conan the Barbarian.* He produced striking designs for the alien warriors, planets and spaceships. Last summer, Gary Demos began the painstaking process of converting Cobb's designs into computer programs.

CREATING COMPUTERIZED WORLDS, STEP BY STEP

Take, for example, the creation of the planet Rilos. First, Cobb drew his conception of the planet. Then drafters and encoders at Digital, working on a VAX computer, converted his work into line drawings known as *vector graphics.* On the monitor, the planet looked like a circle. When the encoders added three-dimensional coordinates, it became a rounded sphere.

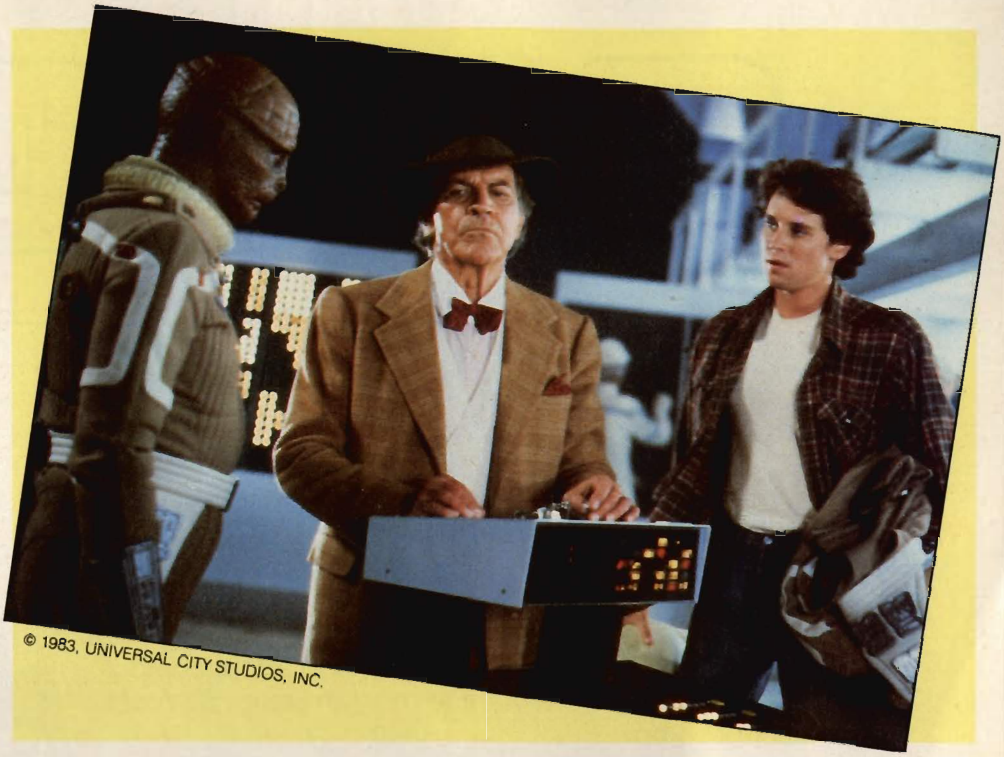
At this point, the technical directors stepped in and called up Rilos on an IMI display monitor. The IMI is equipped to introduce motion. With further encoding, the planet began rotating, although it was still merely a sphere made up of lines.

Then the technical directors shifted to the Cray. They used *raster* graphics, software which adds color, texture and contouring to vector graphics. In the raster mode, they were able to give Rilos oceans, clouds and an array of swirling gases. The director then chose the placement of Rilos's light source, a distant sun which illuminates half of the planet. The final image, called up on a Ramtek monitor, was then scanned, point by point, by the Cray. Finally, when the scene was perfected, it was recorded from the computer onto 35 mm film.

If this same scene had been filmed conventionally, it would have been necessary to create a model of a planet and then to film it using a motion-control camera. But at Digital, the model was created entirely inside the computer.

In the meantime, director Nick Castle, Jr. spent two months filming the live action. The actors—

RIGHT: ***Alex confronts aliens Centauri and Grig.*** *BELOW:* ***This space scene is entirely computer-generated.***


© 1983, UNIVERSAL CITY STUDIOS, INC.

newcomer Lance Guest (see "A Starfighter Is Born," next page) as Alex, veteran performer Robert Preston as the interplanetary messenger Centauri, Catherine Mary Stewart as Alex's girlfriend Maggie, and others—worked on location in a trailer park and at MGM's standard Hollywood soundstages. In some soundstage scenes, they acted in front of blank blue backgrounds. The computer imagery was later superimposed over, or composited with, those blank backgrounds.

FINISHING TOUCHES

Director Castle then moved on to the difficult task of post-production. That's when all the different elements of the movie—live-action, computer animation, sound effects, musical score—were pulled together in time for the film's June 22 release by Universal Pictures. It was also the time when Castle worked with Digital Productions to get the effects he wanted.

"I don't know how the programming really works," Castle freely admits. "But I've heard enough talk to pick up some of the language. I'm basically there to direct the [computer-animated] scenes. I'll ask for more light, or if we can make a scene more realistic. In a sense, I'm the final arbiter who decides whether a scene is real enough."

If *Starfighter* succeeds, Castle contends, it will be because the audience is so caught up in the story that it won't have time to sort out the computer animation from the real thing.

Digital chief John Whitney, Jr. concedes that a few things remain that the computer *can't* do...*yet*. It's one thing, he says, to translate inanimate objects into computer-designed pictures. It's a much bigger challenge to recreate a human figure, with all the subtleties of real-life movement, within a computer.

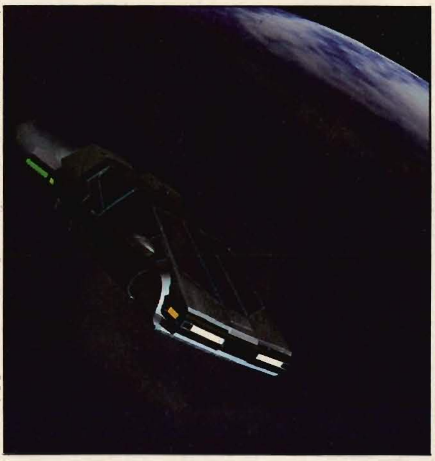
Digital *is* already experimenting with human forms. But as Whitney observes, "What is it about the way *Splash*'s Daryl Hannah moves that makes her a star? How do you create a database that simulates the look and behavior of a personality like that?" He continues: "If we can do that, then someday we'll be able to create a viable performer on screen who looks and behaves just like a real person."

Until then, Whitney offers one final prediction. Within 10 years, he believes, home computers will be able to perform as many split-second tasks as the Cray IS, the earlier model of the Cray X-MP. And, when that happens, home programmers will be able to turn out movies like *The Last Starfighter* on their own.

But by then, effects experts like Digital Productions will be creating movies that are light years away. E

GREGG KILDAY writes about movies and technology, and lives in Los Angeles.

'The computer is not limited to the laws of the physical world...It's like being free from gravity.'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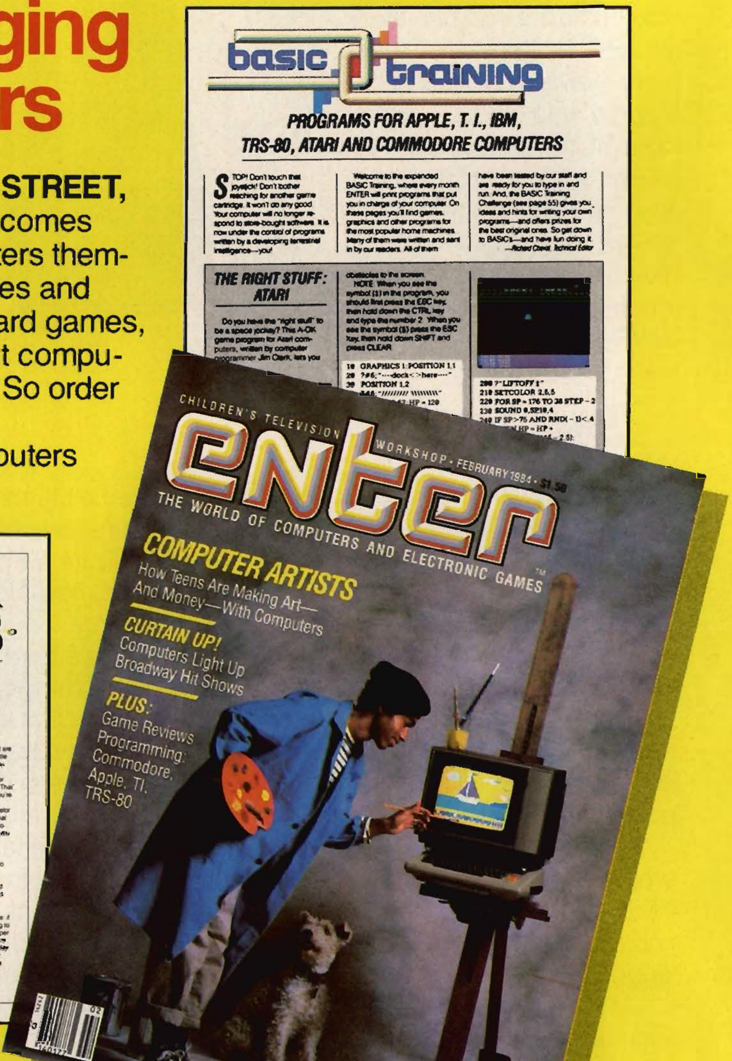

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INTERVIEW

A 'STARFIGHTER' IS BORN

LANCE GUEST GOES FROM ARCADE ACE TO SPACE HERO

BY PATRICIA BERRY

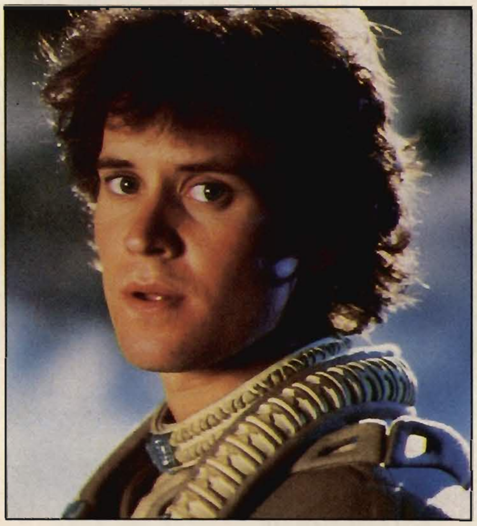


PHOTO © 1983, UNIVERSAL CITY STUDIOS, INC.

A young actor is cast in a movie to play an ambitious teenager. His character's substitute for real-life adventure is an obsession with a video arcade game. It should be a simple role for any young actor.

But when Lance Guest, 23, won the starring role of Alex Rogan in Lorimar Productions' *The Last Starfighter,* he knew little about video games. Even though Lance grew up near California's high-tech haven, Silicon Valley, he was (and still is) more interested in playing contact sports like football than in sacking *Pac-Man* pellets. To play Alex, Lance had his work (and play) cut out for him.

Alex is a champ on a video game called (guess what?) *The Last Starfighter.* What Alex doesn't know is that *Starfighter* isn't just a game. The machine is, in fact, an alien flight simulator used to recruit defenders for the Star League of Planets.

ARCADE EDUCATION

To "study" for his part, Lance went down to Pico Boulevard in West Los Angeles with director Nick Castle, Jr. There, they visited a huge video arcade and watched teenagers play games. "We also blew five bucks apiece," Lance recalls. But the point of the trip was not to teach Lance to play games; it was to study whiz kid *behavior.*

"You could tell the real pros *not* by the way they moved their wrists, but by the calm expressions on their faces," says Lance. "Novices like me were wound up from the start of the first game."

Lance noted other bits of arcade whiz action: Players would move through the first screens almost unconsciously. Very gradually, concentration took over. The eyes would become glued to the screen, the body would stand a little more on guard in anticipation of surprise attacks. As he watched, Lance took in all the motions—to call on them later, when filming of *Starfighter* began.

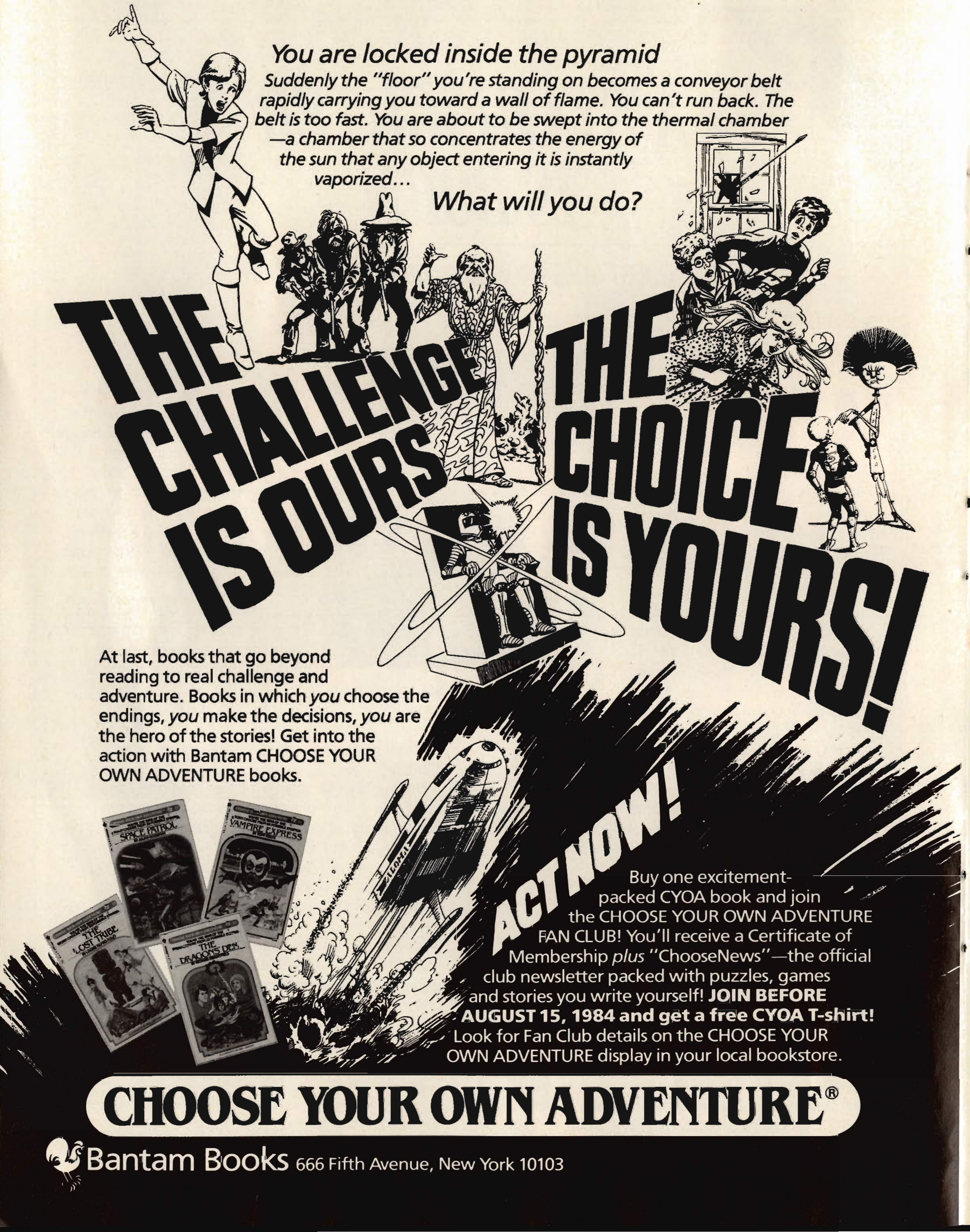
INVISIBLE SCENERY

Surprisingly, Lance found the movie's intergalactic battle scenes easier to tackle. "Alex is just a regular kid," he explains. "When he's hauled into space, everything's confused and unexpected. He's a normal teenager reacting to an extraordinary situation."

But special effects in films like *Starfighter* are added after filming is complete, so Lance often found himself reacting to empty space. For instance, when Alex rockets through the galaxy dodging enemy fire, Lance was actually sitting in a stationary ship looking at thin air. "I had no idea what the computer graphics would look like. So," he says, "You wing it. I'd ask 'What *exactly* is happening?'" and the director filled in the details.

Not *all* the bombardments were computer-generated, however. In one scene, Alex is being chased on earth with caps exploding all around him. "I didn't have a stand-in for all the jumping and diving," the actor says proudly. Arcade ace or not, Lance didn't get in shape for *those* scenes by playing *Pac-Man.*

PATRICIA BERRY is associate editor of ENTER.



You are locked inside the pyramid

Suddenly the "floor" you're standing on becomes a conveyor belt rapidly carrying you toward a wall of flame. You can't run back. The belt is too fast. You are about to be swept into the thermal chamber—a chamber that so concentrates the energy of the sun that any object entering it is instantly vaporized...

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SUMMER GAMES

'84

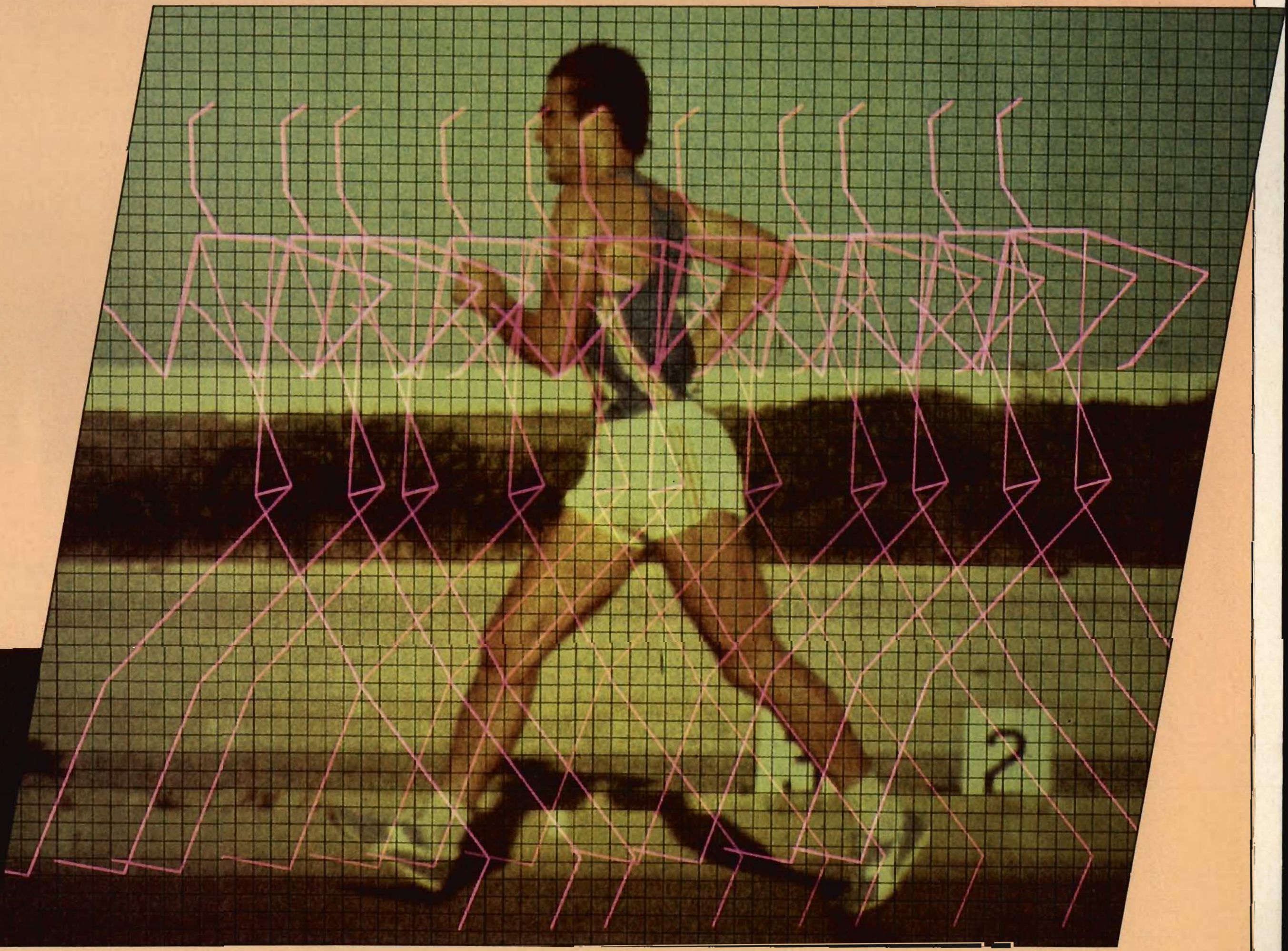
THE ON-LINE OLYMPICS

It began in Greece, many centuries ago. The greatest athletes gathered to compete—to hurl the javelin and fling the discus, to run, leap and prove they were Olympic champions. It was a great, but simple, event.

Today, the Olympics remain the greatest moment in all of sports. But they are no longer a simple gathering. In a few weeks, thousands of athletes and spectators from around the world will gather for the 1984 Olympics in Los Angeles. To make these Games happen will take a truly Olympic effort.

Computers are a big part of this effort. From the training of athletes to the lighting of the Olympic flame, from the scheduling of competition to the Games' closing ceremonies, computers are playing an important role.

In this special Olympic section, ENTER will show you how computers are making a difference this year. Turn the page and you'll get an inside look at the computerized Summer Games—1984's On-Line Olympics.



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COMPUTERS IN COMPETITION

TEN WAYS THAT THEY'LL MAKE A DIFFERENCE

BY ELIZABETH HETTICH

There will be a lot of high-tech history-making going on at this summer's Olympics. Here are some of the ways computers will contribute.

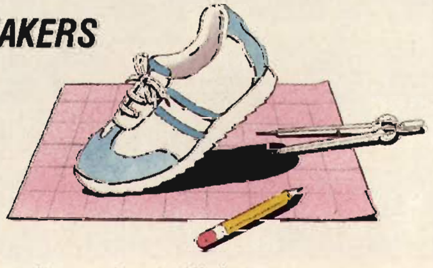
On your mark, get set...Let the Games begin.

1 KEEPING THE TORCH RUNNING

The Olympic Torch Run is a relay that begins in Greece at the site of the original Olympic Games. The Torch arrived in New York City on May 8. Since then, runners have been carrying it through 32 states. Their destination? Los Angeles and the July 28th opening ceremonies.

Two AT&T teletype computers have been accompanying this cross-country caravan, providing an important link-up to the Los Angeles Olympic Organizing Committee (L.A.O.O.C.) and to the press. The teletype computers are helping these cross-country runners by charting the best running routes. The computers also are supplying information about where athletes can find water, meal and service stops.

2 SLEEKER SNEAKERS



From start to finish, most of the U.S. Olympic Track and Field Team will dash for the gold on computer-designed track shoes. These aren't your basic high-top playground sneakers. Two computers were used to ensure that these Nike sneaks offer maximum support, comfort and springiness.

The first computer, a PDP-1000 mainframe, tested how the sneakers responded to the impact of hitting the ground. Shoe designs were created on the second computer—a McDonnell Douglas Unigraphic System. Then a machine directly hooked up to the computer manufactured the sneaks to the specifications.

3 HOME OF THE STARS

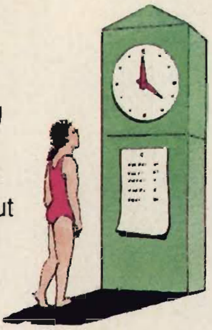
If 12,000 of your friends were planning to visit and asked you to find them a place to stay, what would you do?

When the L.A.O.O.C. faced that very problem, it turned to an IBM System 38 mainframe computer for help. "It was no small feat," says IBM's Brian King. "The Olympic Committee needed to keep track of how many athletes and coaches are coming and how long they're staying."

Thanks to this data, the Olympic Committee found all 12,000 athletes and coaches a place to stay.

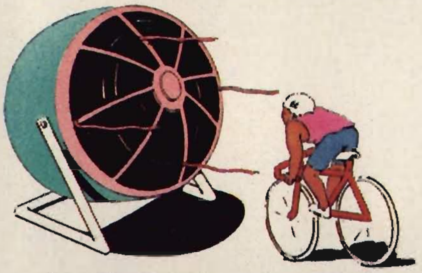
4 RIGHT PLACE/RIGHT TIME

Track teams shouldn't have to dodge javelins and shotputs. But scheduling hundreds of events in two weeks of Olympics is a tricky job. An IBM System 38 mainframe made the task a little simpler.



"There are 150 teams, 500 training sites and then lots and lots of rules governing the use of the sites," says Jim Murray of the L.A.O.O.C. "Without the help of a computer, working out the schedule would be a nightmare. I hate to even think about it!"

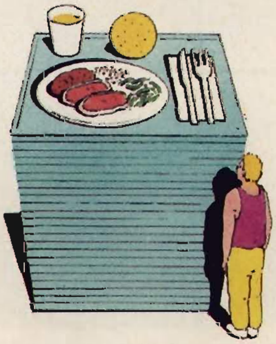
5 STREAMLINED BIKING



If the U.S. Bicycle team races ahead of the competition, thank the computer.

The team's bikes were tested in wind tunnels for aerodynamic efficiency, and the data from these tests were computer-analyzed. The information was then used to build bicycles that would encounter as little wind resistance as possible. The results, says Mike Melton of the U.S. Cycling Federation, are track "bicycles [that] may take as much as a minute off a rider's racing time."

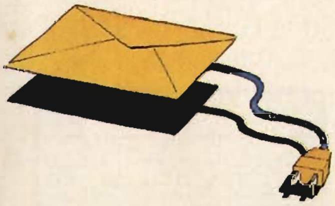
6 OLYMPIC MENU



You can be sure a computer helped cook this one up—planning the menus for 12,000 finicky sports stars from countries all over the world.

The L.A.O.O.C plugged in their handy IBM PCs, using them to store recipes, keep track of all food delivered to the Olympic villages, record how much each athlete is eating and how much it's all costing.

Some food figures have already been worked out. About 81,969 pounds of grapefruit and 1,322,000 gallons of milk will be consumed during the approximately one million meals that will be served to the athletes during the games.

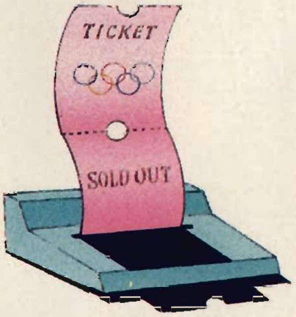


7 ELECTRONIC MAIL

The 23 sports arenas of the Olympics cover more than 4,500 square miles. With thousands of people spread over all those miles, it's a wonder anyone will ever be able to contact anyone else.

To solve this problem, more than 1,700 AT&T teletype computer terminals have been placed at game sites and Olympic villages. The terminals will be used by Olympic team members, officials and the press to send messages and get updates.

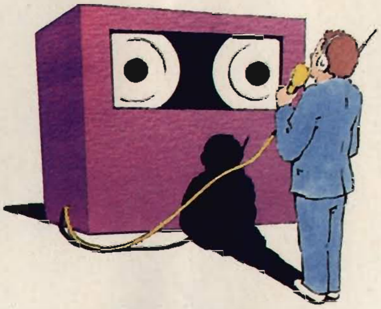
8 TICKETS



It took only one computer—an IBM System 34—to distribute the seven million tickets sold to Olympic events. This mainframe kept track of every seat for every event, took ticket orders, and mailed tickets to the lucky fans who ordered in time.

The IBM System 34 also had a less friendly job: when events sold out, it notified people there was no place left to sit.

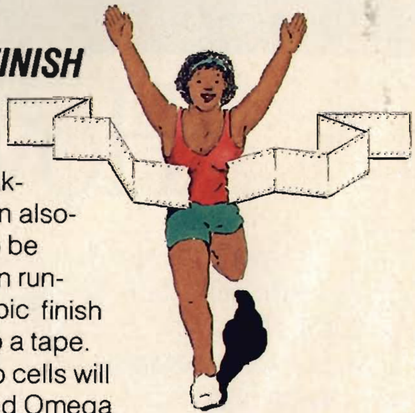
9 ATHLETE INFO



Ever wonder how sportscasters know everything about athletes' past scores and personal histories? This summer, computers will supply records on every participant and keep track of all records.

The information is being stored on an IBM mainframe computer owned by the McDonnell Douglas Company. This computer is in Long Beach, California, away from the Olympic sites. But sportscasters will have instant access to the information, via modem.

10 RACE TO THE FINISH

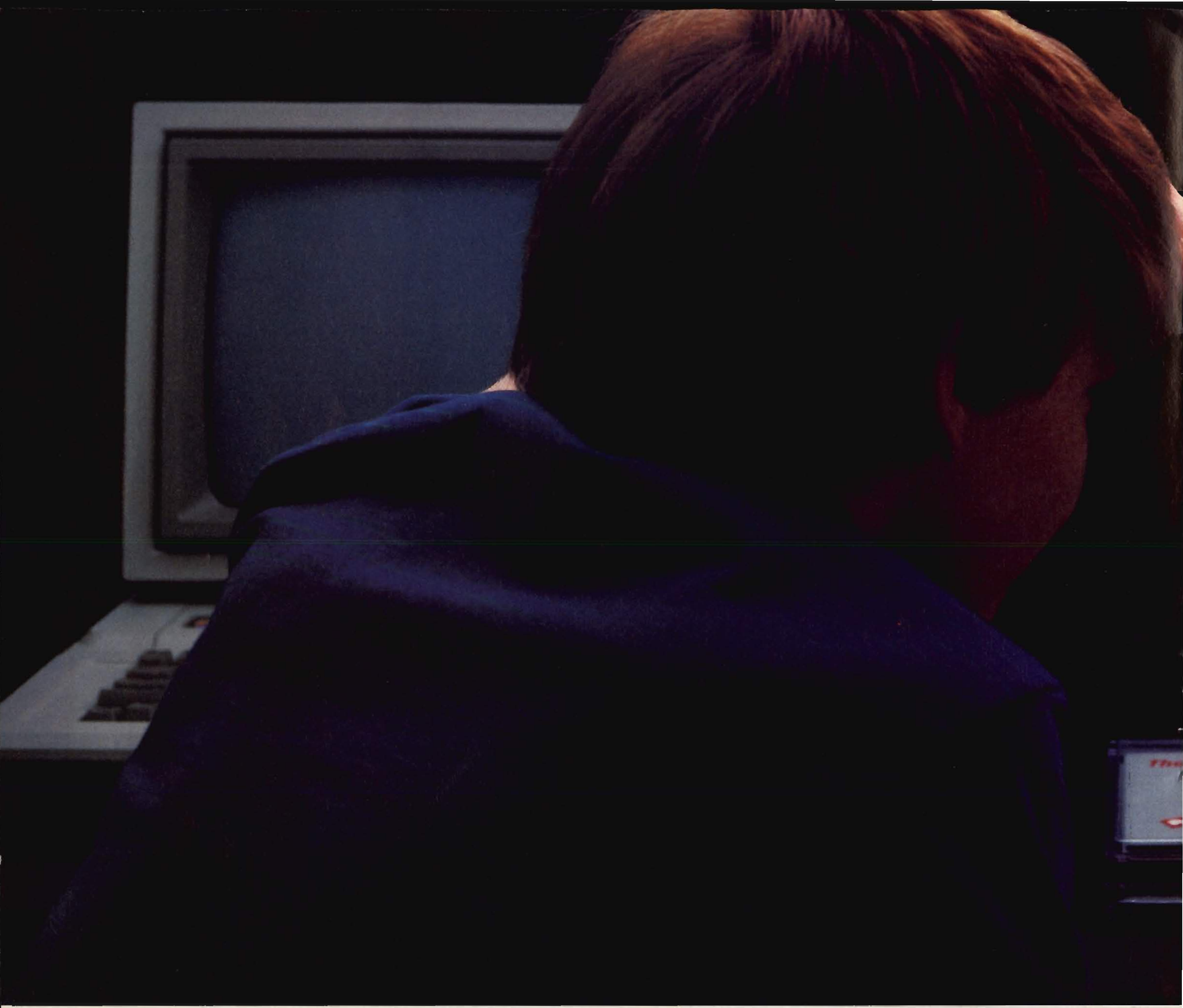


When a fraction of a second can make the difference between breaking records and being an also-ran, time-keeping has to be totally accurate. So when runners hit this year's Olympic finish line, they won't just snap a tape. A beam of infrared photo cells will help a specially designed Omega computer to clock the time to a 1000th of a second.

And for this year's swimmer, Omega has designed an electronic touch pad built right into the pool. When activated, the pad will stop a computer-controlled clock. On land or in the water, computers will be counted on to stop the Olympic show.

ELIZABETH HETTICH is assistant editor of ENTER.

ILLUSTRATIONS © MIN JAE HONG



How to talk your parents

There's a new Apple® Personal Computer called the IIc that's so complete and so affordable that getting your parents to buy one should be easier than learning Logo.

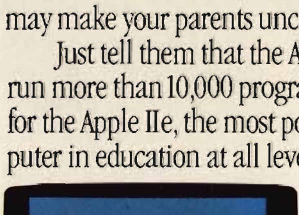
If, that is, you know what to say.

For example, don't tell your parents that the IIc has the first true 128K VLSI motherboard, dual built-in RS-232 ports and a built-in half high disk drive. Or that it has a switchable 80/40 character display and built-in mousetronics so it can use an AppleMouse.

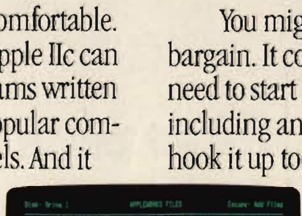
You know that's incredible in an 8 pound* computer, but all those specs may make your parents uncomfortable.

Just tell them that the Apple IIc can run more than 10,000 programs written for the Apple IIe, the most popular computer in education at all levels. And it works just the same as the Apple computers you learn on in school.

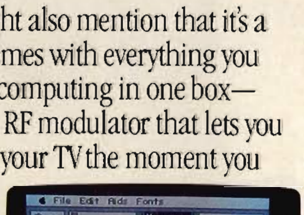
You might also mention that it's a bargain. It comes with everything you need to start computing in one box—including an RF modulator that lets you hook it up to your TV the moment you get it home. There's even a free 4-diskette course on computer basics they



The IIc shows off its true colors with SubLogic's Flight Simulator II.



AppleWorks—advanced business software even a parent could love.



With MousePaint, you could become the next Picasso. Or the next Charles Schulz.

into parting with $1300.

can use when you're too busy to show them how.

All for under $1,300.**

Of course, they probably won't want to hear that it runs more games than any other computer in the world except the Apple IIe.

But they might like to know that it also runs advanced business software. Including specialized programs for every profession from doctoring to farming to astronauting. Not to mention personal productivity software to manage their personal finances and taxes.

Speaking of which, they can deduct part of an Apple IIc's price from their taxes if they use it for business.

Even if they always keep it at home.

Don't confuse them right now with the wide array of Apple IIc accessories and peripherals. Like Apple's 1200/300 modems. Or the IIc's low cost full-color graphics/text printer, Scribe.

But assure them that your IIc can grow just as fast as you do.

Now, if all of these carefully reasoned arguments fall on deaf parental ears, don't despair. There is still one thing more you can do.

Get a paper route.

The IIc Bag has room for a power pack, software, even notebooks. So it's worth a few extra bucks.

** The IIc alone weighs just 7.5 pounds. Power packs, monitors, printers, modems and mice can make it as heavy as you'd like. ** Suggested retail price. © 1984 Apple Computer, Inc. Apple and the Apple logo are trademarks of Apple Computer, Inc. For an authorized Apple dealer nearest you, call* ***(800) 538-9696.*** *In Canada, call* ***(800) 268-7796*** *or* ***(800) 268-7637.***

TOUCH

A COMPUTER-AGE DOCTOR TURNS ATHLETES INTO WINNERS

BY KEN WILSON

Olympic gold medal winner Al Oerter is hurling the discus farther than ever—and he's got a joystick and video screen to thank for the improvement.

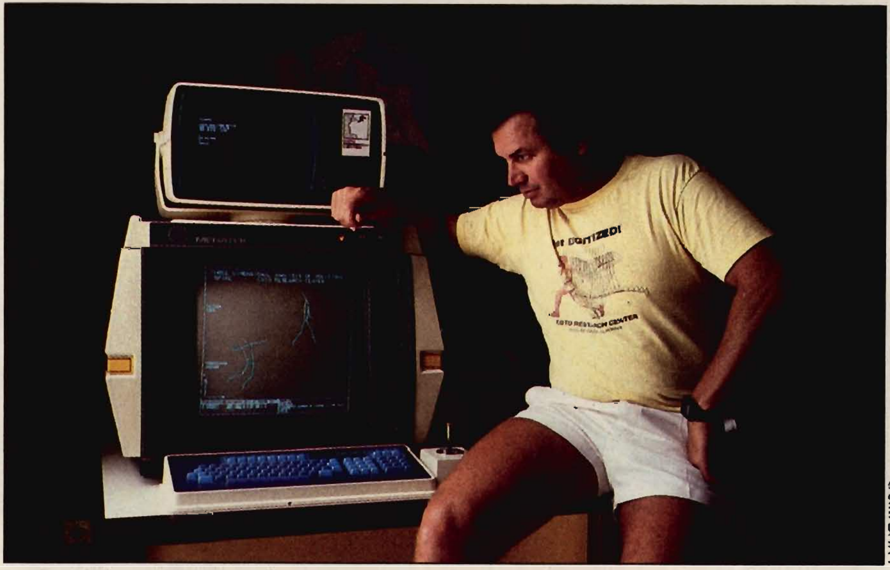
The U.S. Women's volleyball team went from being one of the worst to one of the top teams in the world—and they're getting help from the same system.

The system is called the Digitizer. The results are remarkable. Ask Olympians like hurdler Edwin Moses and discus thrower Mac Wilkens, or other great competitors like tennis star Jimmy Connors and marathon runner Bill Rodgers. Each has gotten help from the joystick-operated computerized Digitizer of Dr. Gideon Ariel.

"When you analyze athletics scientifically," says Dr. Ariel, "you see that it's possible for many of the best athletes to do even better."

ACTION ON SCREEN

As a former Olympic discus thrower, Gideon Ariel knows what it means to be a tough competitor. Since 1971, he has been using this knowledge and the science of *biomechanics* to help other athletes achieve their best performance.



© JIM BRITT

Dr. Gideon Ariel is using computer technology to analyze athletes in action.

Biomechanics is an attempt to apply the laws of physics to the human body, explains Ariel. "Sports problems should be treated like engineering problems. An engineer doesn't just *guess* that a bridge can hold up under traffic. She proves it mathematically.... We can do the same for athletes."

The main tool of biomechanics, the Digitizer, lets Dr. Ariel analyze an athlete's weaknesses. He can then go on and design ways to improve their performance. "Athletes are just too fast for the human eye to detect a problem," he says. The Digitizer can slow the action down and isolate any problems. The Digitizer alone will not turn a person into a great athlete. But it can provide information to enable good athletes to become even better.

The digitizing process begins with a high-speed 16mm camera. This camera shoots up to 10,000 frames of film *per second*. An athlete comes to Dr. Ariel's Coto Research Center—a high-tech sports facility in southern California—and is filmed in action. Dr. Ariel runs this film through a stop-action

ILLUSTRATION © DAVID FeBLAND

OF GOLD

projector and views it on a specially designed screen.

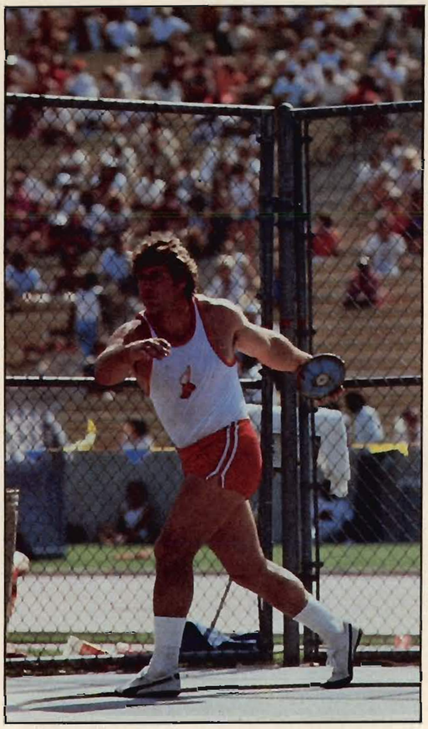
Dr. Ariel—or one of his assistants—then stops every frame of the film and touches a sonic pen to the screen. This pen makes a mark on the athlete's critical joints—shoulders, knees, elbows, etc. On a separate video monitor, these points are shown as a series of dots. Dr. Ariel touches a button on the computer and the dots are connected to create a stick figure of the athlete in action.

By moving a joystick on the control panel, Dr. Ariel can reposition the stick figure. This allows him to examine the athlete's movement from every conceivable angle. "We can see what you're doing wrong and what you're doing right," explains Ariel. "Most important, we can suggest ways for you to improve."

GETTING RESULTS

Olympians and other athletes are impressed with the Digitizer's information.

"The Digitizer helped me re-learn my throw, and it really paid off," says discus thrower Oerter, who has already competed in four Olympics. After working with Ariel and the Digitizer, Oerter improved enormously. In a practice session, Oerter even tossed the discus further than the world record of 233′5″. The Digitizer showed another Olympic discus thrower, Mac Wilkins, that he could improve *his* toss by keeping his front leg stiff while letting go of the discus.


© STEVEN E. SUTTON/DUOMO

Olympian Al Oerter hurls the discus farther with help from the Digitizer.

The Digitizer also showed Olympic hurdler Edwin Moses how to move more efficiently over the hurdles. And it let tennis pro Jimmy Connors see that he could strengthen his serve by keeping both feet on the ground when hitting the ball.

But Gideon Ariel's most impressive achievement has been in helping the U.S. Women's Volleyball team. The Digitizer provided data that helped the team improve on-court efforts.

"We use it to analyze skills and improve techniques. We also use it to analyze the differences between our players and our opponents," says team coach Arie Selinger.

Recently, for example, Dr. Ariel used the Digitizer to compare Flo Hyman of the U.S. team with Yokayama, her counterpart on the Japanese Women's Volleyball team. The Digitizer showed that Yokayama was a more powerful spiker—even though she is 11 inches *shorter* than the 6′5″ Hyman. Yokayama hit the ball at the strongest point in her leap, while Flo hit it too late.

"We took that information and designed a training program to help Flo and the team "improve," says Selinger. The women's team is now considered a top contender for the Olympic gold medal.

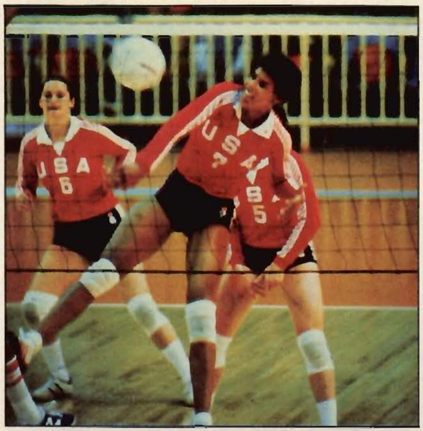
HELPING ATHLETES TRAIN

It takes hard training to put the Digitizer's lessons into practice. To help athletes take this next step, Gideon Ariel has created the *Ariel-Tek,* an exercise machine similar to a Nautilus or Universal machine. But instead of using weights and pulleys, the Ariel-Tek uses a computer-controlled pneumatics (compressed air) system to create resistance.

Run by a Radio Shack home computer, the Ariel-Tek can be programmed for a leg, chest, abdomen, shoulder or arm workout. And the pneumatic system can be fine-tuned so that athletes must exert an exact amount of effort.

A number of U.S. Olympic shot-putters use the Ariel-Tek, as does the entire Women's Volleyball team. And even non-Olympic athletes are excited by the system.

"There's no comparable piece of equipment on the market now,' says Bob Ward, head of conditioning for the Dallas Cowboys professional football team. "It's the 21st century today."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Digitization helped improve Flo Hyman's volleyball game.

If the Ariel-Tek and Digitizer seem like 21st century equipment, consider Gideon Ariel's latest project.

On his drawing board is a system that will use holography (a photo process done with lasers) to create 3-D images of an athletic performance. Dr. Ariel would film an athiete from three different angles at once. Then he would digitize this action and combine all three images to create a three-dimensional image. Using a laser, this image could be projected into a viewing area.

"An up-and-coming athlete could watch a champion perform and copy that performance," says Dr. Ariel.

It might even be possible to project the image life-size. Then a young athlete could step inside the champion's hologram and perform along with the image.

It will take time before inventions like this can help tomorrow's athletes. Meanwhile, today's athletes—competitors like Al Oerter and Flo Hyman—have made great gains thanks to the work of Gideon Ariel. He has helped them to reach farther than ever before.

At the Olympics in Los Angeles, they will reach for the gold. ⊡

KEN WILSON is a freelance writer in Los Angeles.

A sonic pen pinpoints the action...

... Dr. Ariel then analyzes the results.

AMERICA'S TRAINING CENTER

HIGH-TECH HELP FOR U.S. OLYMPIC ATHLETES

BY NORVELL BRASCH

The U.S. Olympic team is ready to face the world. America's athletes have never been so well prepared; but then, America has never before had a state-of-the-art training site like the Olympic Training Center in Colorado.

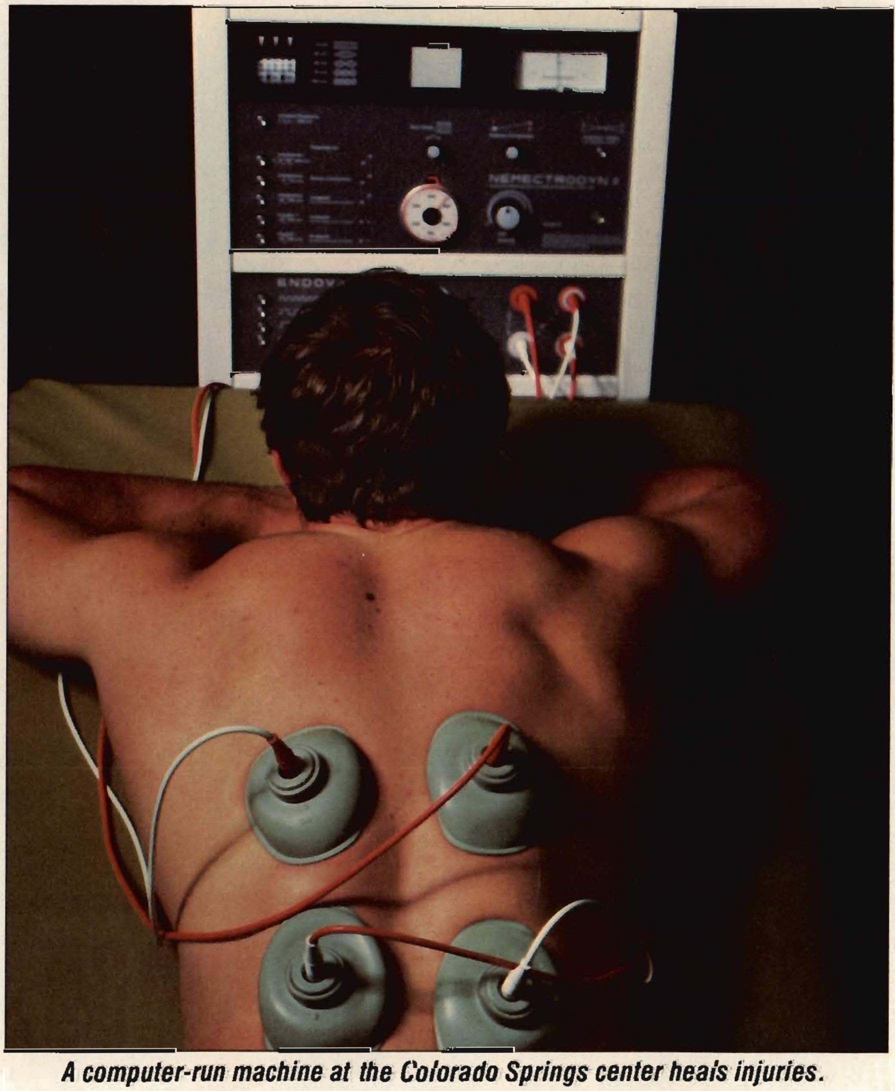
Hundreds of athletes in every sport—from race walking to rowing, archery to weight lifting—have used the Center to prepare for the 1984 Olympics. They practice with top trainers and coaches and use the finest athletic equipment available. They also get special help from computers in the Center's Biomechanics Laboratory.

"We provide a microscope [to help] the athlete," says Dr. Charles Dillman, director of the Lab.

INTENSIVE TRAINING

More than 12,000 athletes use the Center each year. A few hundred athletes, the best in the country, had their training paid for by the U.S. Olympic Committee (USOC). These potential Olympic Team members train all year. As the Olympics approach, they are sent here for a few intensive weeks.

The Center's gym, track and



© BRIAN PAYNE/BLACK STAR

A computer-run machine at the Colorado Springs center heals injuries.

AMERICA'S TRA

ILLUSTRATION © DAVID FeBLAND

weight room facilities give athletes a place to train. The Biomechanics Lab analyzes their performances and helps them improve.

"Computers let us analyze in more detail and give quicker feedback," says Dr. Dillman. "The coach still has to take the information, and the athlete has to act on the advice."

The Biomechanics Lab can study an athlete in any sport. Take race walking, an event where competitors stride at top speed without breaking into a run. Dr. Dillman's staff will film a race walker in action, tracking movement on a high-speed video camera that can record 200 frames per second. The race walker performs on a force platform, which records the pressure he places on his foot.

The Biomechanics Lab researchers then go to work. Using computers, they synchronize the film footage with the data produced by the force platform. Researchers, coaches and athletes look for problems: Is the racer planting his foot too far in front? Is there a substantial difference between the force produced by each foot that might indicate a weakness in one leg?

These may seem small points but, explains Sandy Bauer, Dr. Dillman's assistant, they can make a very big difference. "A race walker who wastes two centimeters in every stride has produced enough excess vertical motion at the end of 20 mile race to have climbed the Empire State Building," he says.

Individual athletes aren't the only ones to benefit from the Center's Biomechanics program. The U.S. Olympic Rowing Team, for instance, also trained here. When the Olympic rowers were in camp, Dillman's staff put them into a

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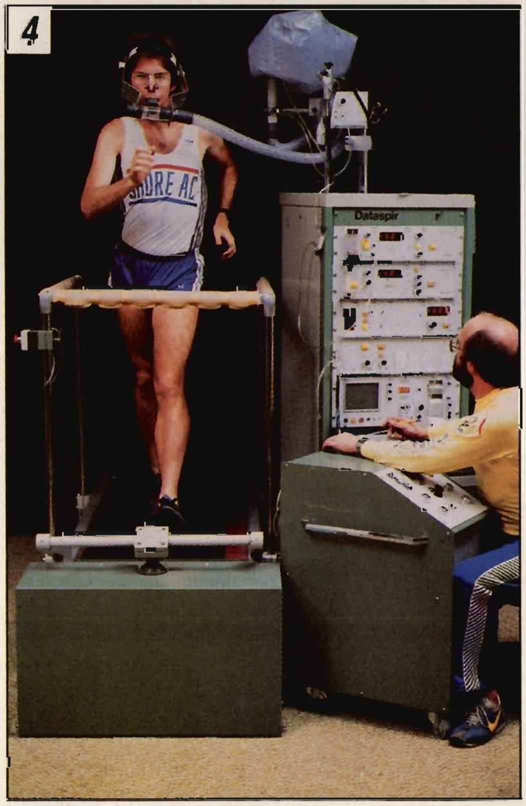

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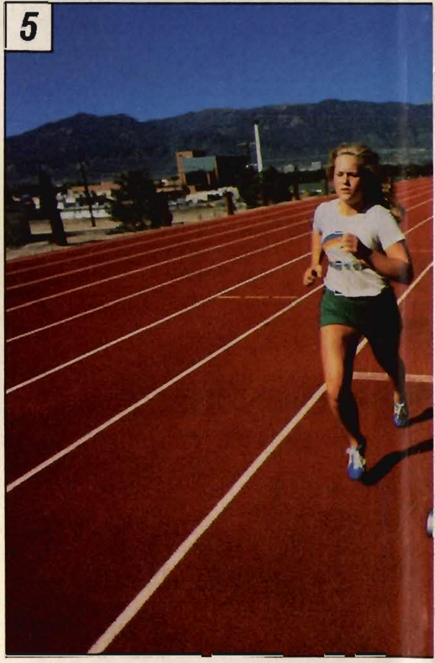
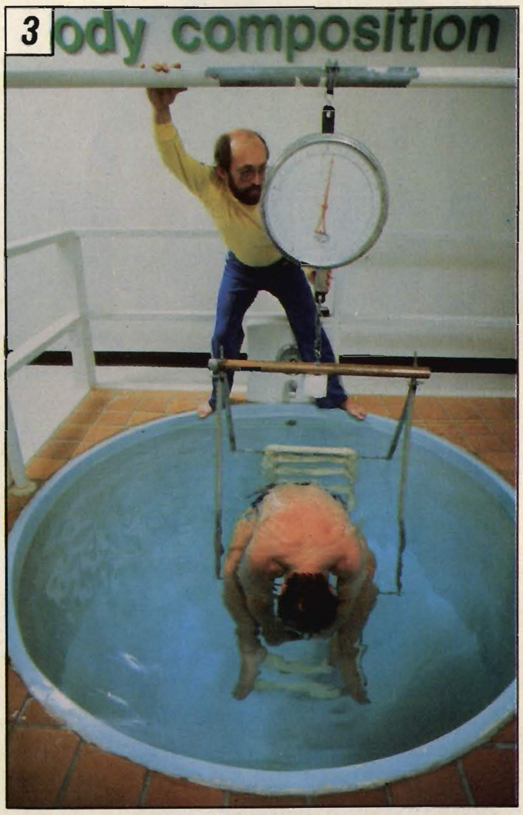


American athletes get a boost from the latest technology at the Olympic Training Center.
***1.** A special sensor helps 18-year-old archer Becky Liggett.*
***2.** Computers monitor the progress of top cyclists.*
***3.** An immersion tank measures an athlete's muscle/fat ratio*

INING CENTER

3



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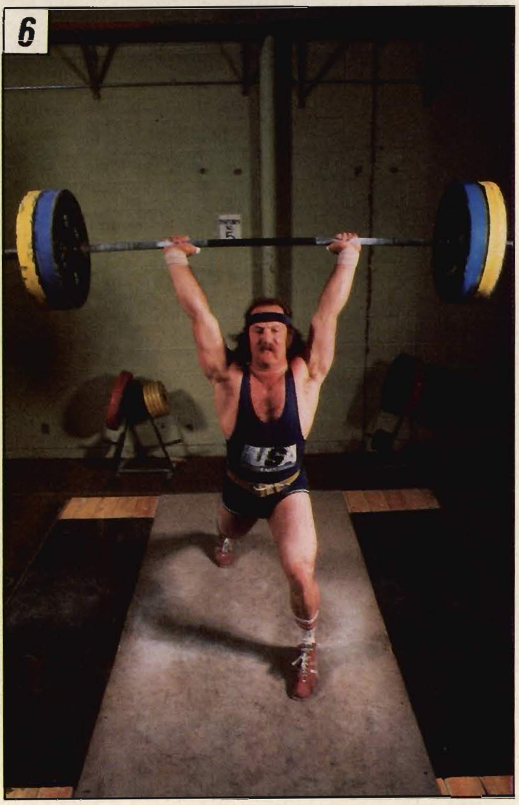


to improve diet and training. ***4.*** *Aerobic fitness is tested when this runner's breathing is monitored by computer.* ***5.*** *Stride-by-stride performance is recorded with high-speed video equipment.* ***6.*** *A force platform gauges a weightlifter's balance.*

© JAMES BALOG/BLACK STAR

simulated rowing scull called an *ergometer*. Small light-emitting diodes were attached to each rower at his or her hip, shoulder, elbow, knee and wrist. As the team rowed, an infrared camera picked up the light from these points and created a stick figure of the rowers on a nearby color monitor. This system, known as SELSPOT, helped the team identify bad habits —such as a rower who raised an oar too soon from the water.

SOLVING AN ARCHERY PROBLEM

One of Dr. Dillman's recent challenges was to help an 18-year-old archer named Becky Liggett regain her world-class form.

For some reason, Becky's usual steadiness and accuracy were off when she arrived at camp this past spring. Dr. Dillman devised a system that would help Becky and her coach to understand what she was doing wrong. A SELSPOT sensor attached to the end of the bow and to the target recorded any movement in the bow during the last second before shooting. At the same time, a force platform marked shifts in Becky's center of gravity.

The computer revealed some interesting results: Becky's open stance kept her very steady from left to right, but she tended to move slightly back from the target.

With the information, Becky made slight adjustments in her stance. The changes seem to be working. "I'm on the comeback," Becky says of her time at the Training Center, "and I'm ready to get back in." With Dr. Dillman's high-tech help, she hopes to make it all the way to the Olympic finals. ◻

NORVELL BRASCH is a freelance writer in Denver.

CARL LEWIS

THE BROAD JUMP CHAMP LEAPS INTO THE COMPUTER AGE

BY KATHLEEN W. STORFER

As a kid, Carl Lewis seemed too small to be an athlete. Yet when he was 12 years old and only 4′11″ tall, Carl leaped to his first big victory—winning the long jump competition at a youth track meet in Philadelphia.

What was really important to Carl that day was meeting his hero, Jesse Owens, the legendary track star who won four gold medals at the 1936 Olympics. Owens was impressed by the youngster from Willingboro, N.J. He was amazed that a small kid could be such a tough competitor.

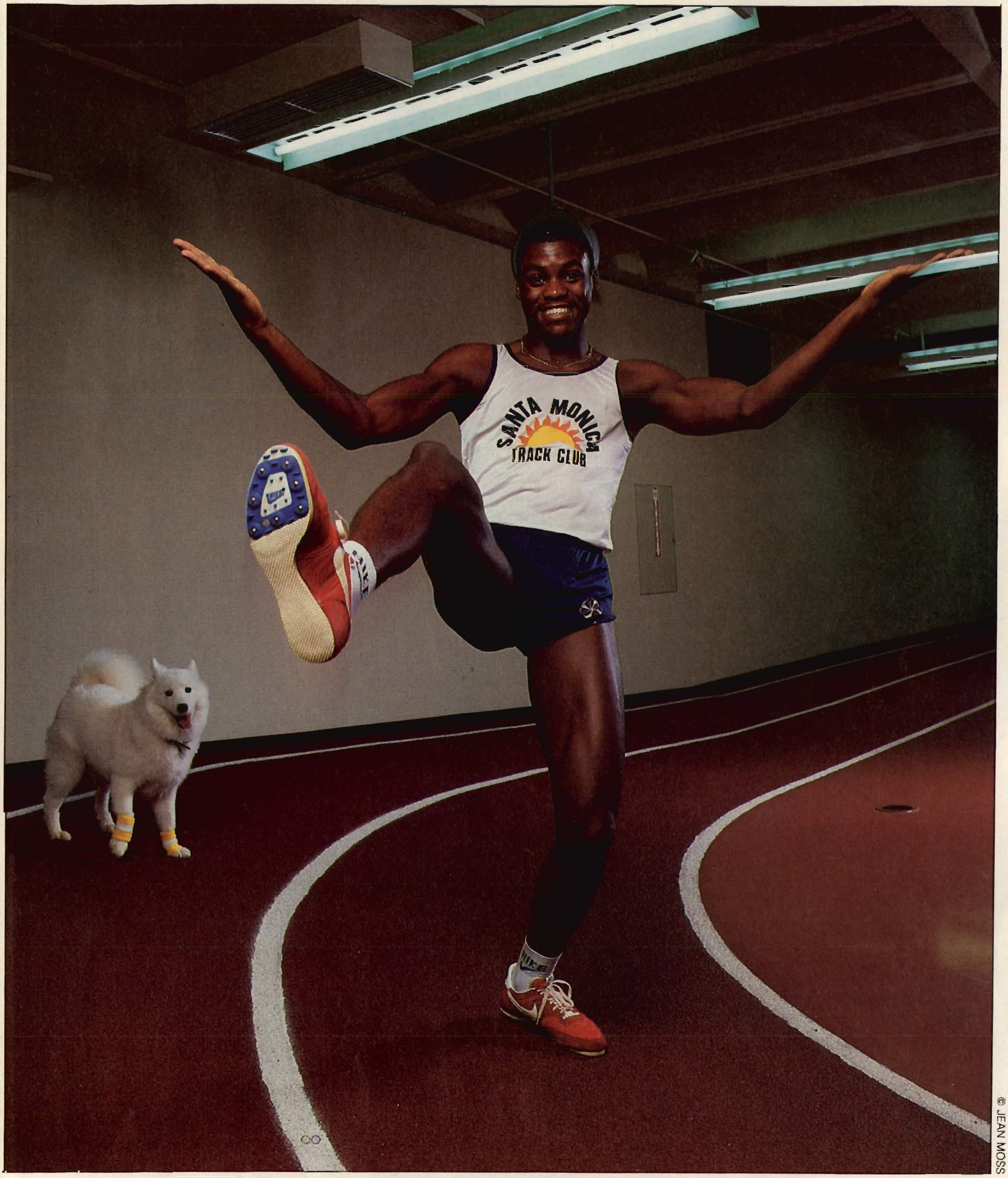
"You sure are little," Owens told Carl that day "and you just happened to win this thing because you're so determined."

Today, Carl Lewis is 23 years old, stands 6′2″ tall and weighs 180 pounds. He's no longer a little guy, but he still believes he can be a winner. With a bit of high-tech help, and support from the other great athletes in his family—like his sister, Carol—Carl promises to be one of the most important American athletes at the Summer Olympics in Los Angeles. He has a chance to match Jesse Owens' accomplishment by winning four Olympic gold medals—in the 100 meter dash, 200 meter dash, 400 meter relay and in his specialty, the long jump.

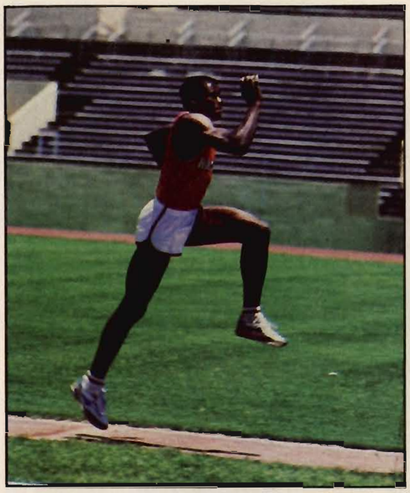
A trophy winner at 12, Carl was still a long way from the '84 Games.

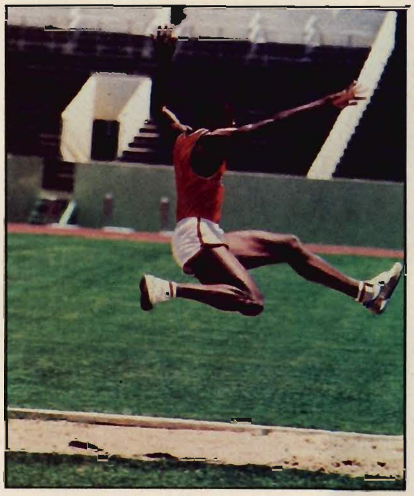
Carl and his coach, Tom Tellez, know it will take more than determination to win in competition with the world's finest athletes. So they are training hard, pushing Carl's natural abilities to the limit—and, yes, getting some help from computers.

Carl is a top-ranked runner. But it is the long jump that offers him the greatest challenge. That challenge is the world's record jump—29′2½″—set by Bob Beamon of the U.S. in the 1968 Olympics. Beamon's


SANTA MONICA
TRACK CLUB

© JEAN MOSS





jump beat the previous world's record by almost two feet, and until recently was considered unbeatable.

But Carl Lewis believes he can break Beamon's record. "My potential is farther than that," he told *The New York Times*. "My goal is 29 feet, but I think 30 feet is possible." In fact, Carl has come close to breaking the record a few times. His best jump, the second longest in history, was 28 feet, 10¼ inches). If he improves on his best by just five inches, he'll do it.

A GIANT LEAP

Two years ago, in an effort to get that extra distance, Carl started working with the Elite Athlete biomechanics program. This program, run by Dr. James Hay of the University of Iowa, works with some of the top track and field athletes in the nation. The program is similar to the biomechanics work being done by Dr. Gideon Ariel (see the "Touch of Gold" story in this issue).

"With Carl," says Dr. Hay, "Coach Tellez wants to particularly focus on velocity patterns, angle of take-off and stride length."

"We're trying to get maximum acceleration," says Tellez. "The more speed, the longer the jump."

In order to help Carl jump farther, Dr. Hay first collects data about Lewis's style in competition. Hay does this by traveling to major track meets and videotaping Carl in action. Rolling this videotape frame-by-frame and using a special stylus, Dr. Hay marks 21 different points on the image of Carl jumping. Hay then feeds this information into a computer to create a stick-figure diagram of the actual jump. This figure gives Coach Tellez an opportunity to analyze Carl's jump in detail.

By examining the computer image, Tellez saw that Carl was "chopping" his last four strides, hesitating ever-so-slightly as he neared the jump line. This cut down Carl's speed and the distance of his jump. In training, Coach Tellez used this information to help Carl stop hesitating, thereby improving his stride.

The information provided by Dr. Hay's computer "helps us substantiate anything being done in training...it measures those things [we've] worked on," says Coach Tellez. But, he stresses, the computer and biomechanics program only helps identify specific problem points. "It's only a tool, not an end in itself," says the coach. "It's worthless unless the information is interpreted correctly."

The most important things going for Carl, says Tellez, are his own physical and mental abilities. Those are traits that can't come from a computer.

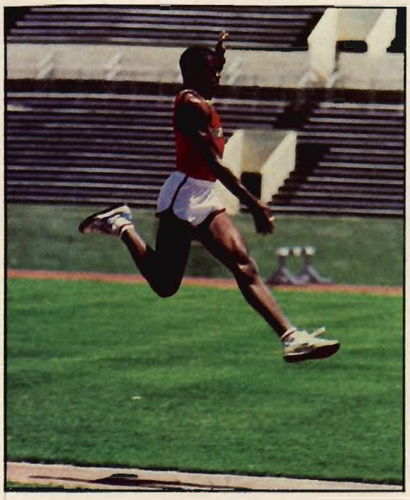
The Lewis family has two Olympic-bound stars: Carol and Carl (front).

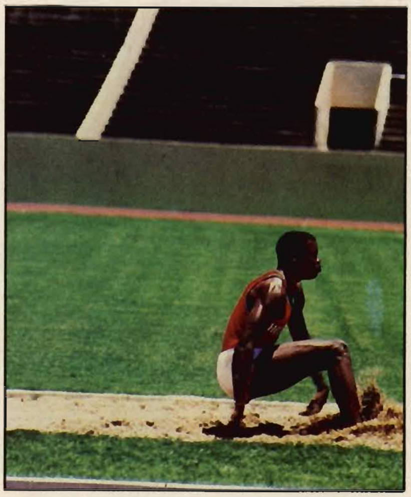
© MANNY MILLAN/SPORTS ILLUSTRATED, TIME INC.

RUNNING IN THE FAMILY

Carl Lewis has worked hard to improve his abilities. And he's gotten some help from other great athletes—his parents, brothers and sister.

"We always stressed individual





PHOTOS © MARK PERLSTEIN/SPORTS ILLUSTRATED, TIME INC.

achievement over winning," says Carl's mother, Evelyn. "And when he improved, we'd praise him for it."

Both of Carl's parents, Evelyn and Bill, were top track stars. His mother competed as a high hurdler in the first Pan-American Games. Today, Carl's mother and father coach track at rival New Jersey high schools. His brother, Mackie, was an excellent long jumper in high school and his other brother, Cleveland, played professional soccer for a few years.

But Carl's most famous sibling is his sister, Carol. She's the world's top-ranked female long jumper, and likely to be a fellow member of the U.S. Olympic Track Team. While Carl was small and somewhat awkward as a boy, Carol always seemed to be a top athlete.

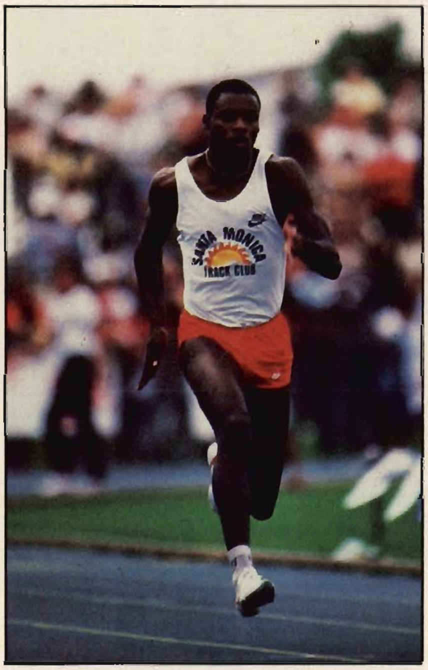
"She was bigger than I was," Carl recalls. "*Everyone* was bigger than I was....It was frustrating to always be the dud of the family, so I really worked hard."

For the Lewis family, sports wasn't really hard work—it was fun. Carol remembers first practicing the long jump with her brother in the backyard, leaping into the sand-filled patio foundation their father had poured. "We used to make sand castles in the pit," she says, "then take a running leap and smash 'em."

But after being "the dud of the family" for a while, Carl became frustrated. At a tenth grade track meet, he told his father: "I'm tired of losing! I'm tired of losing!"

"Well buddy," his father replied, "then the only thing you have to do is start winning."

The winning started soon enough. Carl began to grow bigger in tenth grade. In fact, according to his mother, he grew so fast that he was on crutches for a few weeks because of growing pains. He got stronger and trained hard. By his senior year, Carl had emerged as an athlete of international standing. When he graduated from Willingboro High, he became a student at the University of Houston. There he gets to work with Coach Tom Tellez—whom many consider to be one of the finest long jump coaches in the world.



© STEVEN E. SUTTON/DUOMO

Computers can help, but at the finish line it's still Carl's race.

AHEAD OF HIS TIME

Carl's effort—the training with Coach Tellez, the biomechanics work with Dr. Hay, the constant competition with other top track stars—is pushing him closer to his goal. That goal is more than just breaking the long jump record, and more, even, than winning an Olympic gold medal.

It is to prove that he is an athlete who deserves to be in the company of greats like Bob Beamon and Jesse Owens.

"I think long jump has the best athletes in track and field," Carl says. "It's had Jesse Owens, who set a world record that stood for 25 years. It's had Bob Beamon. It's had people that moved ahead of their time." ◘

KATHLEEN W. STORFER is a freelance writer living in New York City.

OLYMPIC VIDEO GAMES

BY ERIC BABINET, 16

The finish line is just 10 meters away. A burst of strength, a last flick of the joystick, and you are victorious.

These are the Olympic games, but not the ones that will take place in Los Angeles. These Olympic-inspired computer games let you compete at home. After playing them all, I've put together this guide to Olympic video games of 1984.

© CALVIN FINLEY

An Olympic workout for Eric.

ACTIVISION DECATHLON

$34.95 from Activision for the Atari 2600.

The first morning after trying this game, I woke up with an aching shoulder and blisters. That's not a complaint; it's testimony to how realistic *Decathlon* can seem.

As in the real Olympic decathlon, the *Activision Decathlon* features 10 events—the 100 meter dash, long jump, shot put, high jump, 400 meter dash, 110 meter hurdles, discus throw, pole vault, javelin and 1,500 meter run. To move your runner or prepare for a throw, you move the joystick in left-right motion. The faster you move the joystick, the faster your runner moves.

Believe me, it's not as easy as it sounds. I found myself frantically changing hand positions and sometimes even having to rest for a second or two. But once I developed a feel for the game, it became more enjoyable and much less tiring.

Scoring goes from zero to a little above 1,000. Anything above 800 is good. I found myself continually wanting to better my performance, and hoping I wouldn't mess up an event. Pressure does build up, and it can be a big disappointment to tire out in the 1,500 meter race.

The game has a few weak points. Sound effects are minimal. There's an Olympic theme song, a special cheer for high scorers and the thudding sound of runner's footsteps—but that's it.

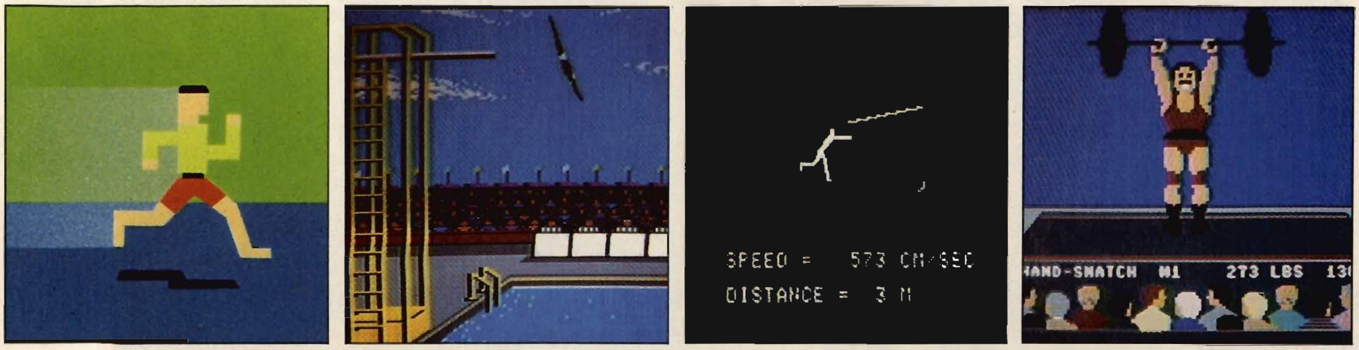
Also, the back-and-forth movement of the joystick gets dull after a while. And it requires a surprising amount of endurance. My eight-year-old brother, for instance, got tired after a few events. Activision doesn't suggest a minimum age for this game, but I think you should be 10 or older to get the most from it.

I recommend this *Decathlon* for those who want a real workout. (Available soon for Comm. 64)

SUMMER GAMES

$30-35 by Epyx for the Commodore 64

If the U.S. Olympic team is as smooth as this game, they'll have no trouble winning medals in L.A. Action is detailed and easy to con-



Racing! Diving! Hurling! Hoisting! These Olympic computer games put you in control of on-screen athletes. (From left to right) Activision's **Decathlon,** *Epyx's* **Summer Games,** *Microsoft's* **Decathlon,** *and Hes Ware's* **HES Games '84.**

trol, and the graphics give you a real sense of being at the Games.

I got a sneak preview of *Summer Games*, because Epyx was still working on it. If the prototype I played is any indication of what the final version will be, I'd say Epyx has itself a hit.

Summer Games begins with an opening ceremony, during which players can choose the country they want to represent. The Olympic events in this game include gymnastics, pole vaulting, skeet shooting, relay racing, swimming and diving.

I was particularly impressed with the diving event. You control the tuck of the diver and perform a somersault, half pike or full pike dive.

Animation is very well done: the diver really looks like a diver. Overall play is excellent.

MICROSOFT DECATHLON

$29.95 from Microsoft for the Apple II or II+

Events in *Microsoft Decathlon* are basically the same as in the Activision game. But there are a lot more variables in this software. That means more ways to improve performance...*and* more ways for you to make mistakes.

Before competition begins, you have to type data into the computer. You are required to set the height of the high jump, the force of the discus throw, and so forth. It takes time to determine what levels work best for you.

In the discus throw, for instance, the higher the force you choose, the harder it is to control release. In long jump, the faster you travel, the more difficult it is to leap at precisely the right moment. Timing is truly everything.

The decathlon also requires different kinds of controls for different events. Running, high jump and pole vault are all controlled by hitting keys on the keyboard. To shotput, you need paddles. These controls are awkward, and the continuous hitting of keys can be tough on keyboard and fingers.

I had another major complaint: there are no sound effects at all. This software is two years old, so its graphics are not equal to the other games here. Still, I enjoyed the variety of ways you have to control action.

Microsoft Decathlon offers a different kind of challenge.

HES GAMES '84

$39.95 by Hes Ware for the Commodore 64

Tired of trotting around the track? *HES Games '84* offers players a different set of Olympic events. Oh sure, you can still run the 100 meters or the hurdles, but this Olympic computer game also lets you attempt such events as weightlifting, diving and archery.

HES Games '84 gives you plenty of control and forces you to plan each move. With archery, for instance, you control the bow, string and position of release. You have to take into account such things as wind speed, distance and even muscle fatigue. It takes time to master the technique.

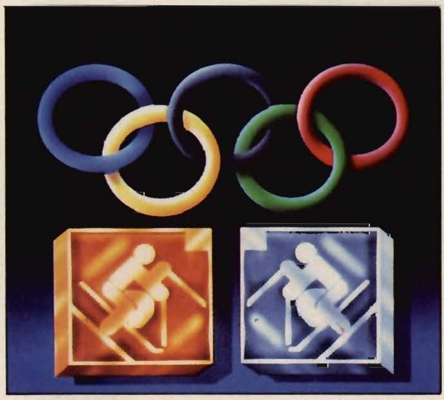
HES Games '84 has some unique features—including an instant replay of your event. You can even copy a performance off a disk, then compete against yourself. Another special feature lets you check your performance against the real Olympic records. That is the ultimate competition.

ERIC BABINET, 16, is a member of the ENTER Youth Advisor board and designer of the video game, Star Crystals.

And Now a Word

HOW TV WILL COVER THE GAMES

© KIM BUTLER



Paint Box creates an almost 3-D image of Olympic rings and logos.

With a crack, the starting gun sounds, and the runners are off.

Your heart pounds as they race around the track. It's as if you are right there.

But you're really at home, watching the Summer Olympics from the comfort of an easy chair. Around the world, more than 2.5 *billion* people are watching along with you. Television, with its vast array of high-tech equipment, has made it possible for billions of people to have a front-row view of the Olympic competition.

To create this up-close coverage, ABC-TV has set up two huge video command centers in Los Angeles. From these centers, the network will broadcast more than 250 hours of the Summer Olympics to almost every country in the world. It will take 2,000 ABC technicians and broadcasters, and some very sophisticated computers, to produce this coverage—the biggest show in television history.

Computer data bases will keep track of more than a thousand miles of videotape footage and hundreds of Olympic statistics and records. Computer-controlled editing facilities will enable ABC to create profile and highlight films almost instantly. Technicians will even use computers to keep track of the more than 16,000 pieces of cable that connect all this high-tech equipment together.

But the most exciting computer contribution to this summer's Olympic coverage are the mind-grabbing special effects and graphics, effects created with three computers—the Mirage, the Paint Box and the Dubner.

The Mirage computer is a small, simple box with buttons and several tiny joysticks hooked up to a minicomputer. As its name implies, the Mirage can create fantastic optical illusions.

Its specialty is twisting, rolling or flipping a picture into startling shapes. Like ABC's other graphics computers, the Mirage can digitize a television image—that is, translate the TV signal into a series of 1's and 0's.

The Mirage can manipulate these 1's and 0's into a variety of shapes. You'll be able to spot Mirage effects during the coverage

© ABC PHOTOGRAPHY

From ABC's video command center, the '84 Games will be beamed to the world.

from Our Computer

BY SETH GREENBERG

of the Games. If you see a blue globe spin, unfold and flatten, or the edge of a picture tear away like peeling wallpaper, you're seeing the Mirage in action.

The two other powerhouses on this computer graphics team are the Paint Box and the Dubner. "Each is used for a specific purpose, though they all overlap to some degree," explains Rolf Drucker, ABC's manager of Electronic Graphic Systems.

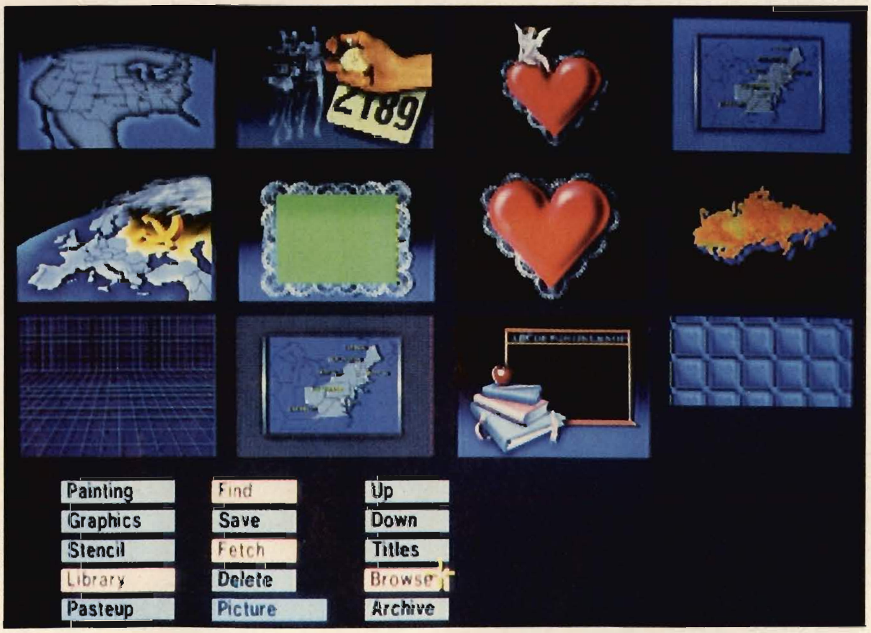
Paint Box is the easiest to use, according to the artists who work on it. That's probably because the artists don't have to write programs to create their images. This computerized rainbow maker is used primarily to blend video images with computer artwork. For example, to create a portrait of an athlete standing in front of his or her country's flag, the artist shoots a videotape of the athlete. Then, using an electronic pen (or the computer keyboard), the artist "pastes" this video picture onto the flag artwork.

"Anything you can draw, color, cut or paste by hand, you can do with the Paint Box," explains Drucker, "Artists take to it very quickly. With the Paint Box, graphics that used to take hours now can be done in minutes."

The other graphic system, the Dubner, is used mostly for animating. When you see white lines trace the path of a shotput or javelin across the screen, or see a high jump or long jump chart change on screen, you're watching the Dubner at work.

The Mirage makes images spin and unfurl.

COURTESY OF MCI/QUANTEL



© KIM BUTLER

Computer screens show artists which images can be combined with Paint Box.

ABC artists create this animation by typing commands into the Dubner's keyboard, or by sketching with an electronic pen on a "bit pad" that is similar to a graphics tablet. The Dubner offers a lot of options, including more than 500 different styles of lettering and 4,000 colors. And it stores all this in a megabyte (a million bytes) of computer memory.

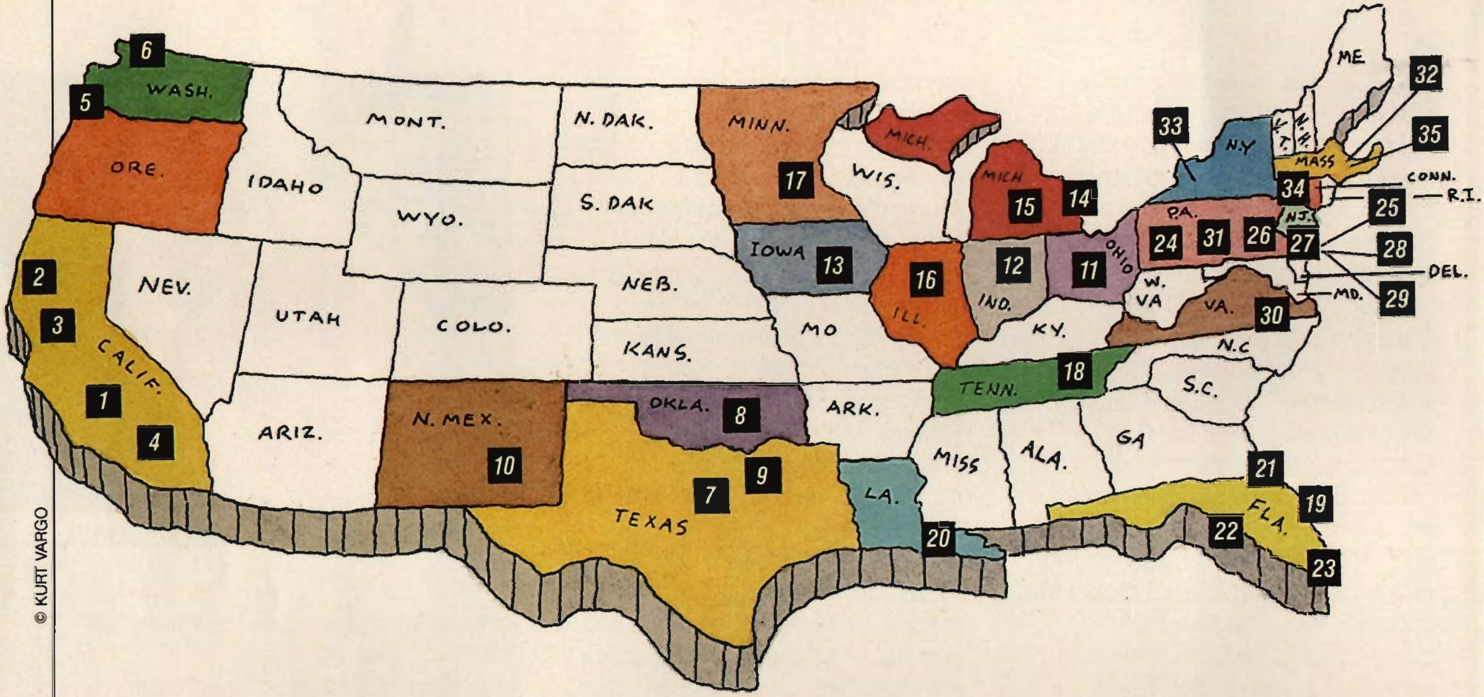
ABC Sports will use 10 Dubners, a Paint Box and a Mirage this summer. They'll help illustrate and animate the 1984 Olympics like never before. So, when you're watching the Games, keep an eye out for computer graphics that twist and swirl and swoop.

And, oh yes, don't forget to watch the athletes, too.

SETH GREENBERG is a freelance computer writer in New York City.

HANDS-ON

PLACES TO PLAY WITH TECHNOLOGY THIS SUMMER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© KURT VARGO

BY KATHERINE DURSO

Wondering what to do with your free time this summer? If you're looking for high-tech fun, we've got some special suggestions. No matter where you live, there are places nearby where you can get hands-on experience with computers, robots, laser beams, and more. We've listed 35 of the best.

We've covered museums, amusement parks and high technology centers. They offer a wide variety of fun and challenge. You can play checkers with a robot arm (The Omniplex, Oklahoma City), make synthesized music (San Francisco's Exploratorium), or check out new computer games (Children's Museum, Indianapolis).

If you're in the mood for something *strictly* computer, you can even rent time on a terminal in many of these places...usually for only a small fee.

CALL FOR INFORMATION

Be sure to call all these places in advance if you plan to visit. Hours and admission prices vary from museum to museum. And if you're thinking of bringing along some friends, check out the group rates—you may save money

If you come across a great place we haven't listed, let us know about it. Write to:

Hands-On High-Tech
ENTER
1 Lincoln Plaza
New York, N.Y. 10023

And have a great summer!

THE WEST

1 ***CALIFORNIA MUSEUM OF SCIENCE AND INDUSTRY,*** Los Angeles, CA (213) 744-7400. How does a computer work? You'll learn that here—plus how computers create

HIGH-TECH

art and make everyday life a little easier. Not enough? Then check out the electronic home of the future.

2 ***EXPLORATORIUM,*** San Francisco, CA (415) 563-3200. This center lets you become a computer artist or musician. Have your speech patterns analyzed by a computer. The hands-on exhibits here let you see—up close—everything from what color is to how thoughts are transmitted.

3 ***LAWRENCE HALL OF SCIENCE,*** Berkeley, CA (415) 642-5134. Learn all about earthquakes, energy and nutrition by playing computer games. Rent time on Commodore and Apple computers, select software from the museum's collection.

4 ***LOS ANGELES CHILDREN'S MUSEUM*** Torrance, CA (213) 370-6863. Direct and watch your own TV show. Sketch and animate drawings on one of the museum's five terminals.

5 ***OREGON MUSEUM OF SCIENCE AND INDUSTRY,*** Portland, OR (503) 222-2828. Learn what microelectronics is about at the "Micro-Tech" exhibit. At "Chips and Changes," learn how computers and robots are changing your life.

6 ***PACIFIC SCIENCE CENTER,*** Seattle, WA (206) 625-9333. Play games and learn about the history and present-day uses of computers. Watch roving robots demonstrate their capabilities.

SOUTHWEST

7 ***FORT WORTH MUSEUM OF SCIENCE AND HISTORY,*** Fort Worth, TX (817) 732-1631. Visit "Physiology Hall" and learn amazing facts about your body, tailored to *your* height, weight and age.

8 ***OMNIPLEX,*** Oklahoma City, OK (405) 424-5545. Play checkers with "Lefty," the robotic arm. Have a chat with a talking computer. Fly high and learn all about birds with a fine-feathered computer pro.

9 ***SESAME PLACE,*** Irving, TX (214) 445-0480. Learn about logic and probability on one of the 50 computers on exhibit. Put your visual and word recognition skills to the test on them, too.

10 ***THE SPACE CENTER,*** Alamagordo, NM (800) 545-4021. Take a walk on the moon. The "Apollo Exhibit" has a laser disc with all the footage from the Apollo mission, and visitors can call up any scene they want.

THE MIDWEST

11 ***CENTER OF SCIENCE AND INDUSTRY,*** Columbus, OH (614) 228-6361. Watch RB Robot do aerobics to music. See-through banking machines let you watch while they work. Play "Strike it Rich" and make millions—at least in fun.

PHOTO BY NANCY RODGER, © THE EXPLORATORIUM

You can be a computer rock & roller in the Exploratorium's Music Room.

© GARY MILLER

Hacker's delight: 30 Apples programmed for fun at Sesame Place, PA.

12 **THE CHILDREN'S MUSEUM,** Indianapolis, IN (317) 924-KIDS. Become the President of the U. S. and make important energy decisions using a computer. Learn basic economics by taking a job as a carnival owner, starship captain or robot salesman.

13 **DES MOINES CENTER OF SCIENCE AND INDUSTRY,** Greenwood-Ashworth Park, IA (515) 274-4138. Ever wonder how tall you'll grow? Here you can consult a computer. See "Compute!"—an exhibit that gives the low-down on computers. Use two terminals for game playing and speech analysis.

14 **DETROIT SCIENCE CENTER,** Detroit, MI (313) 577-8400. Use a voice-simulator microcomputer: you type in words, then it speaks or sings them out. Then, work out your brainpower as computers quiz you on math and science.

15 **IMPRESSION 5 MUSEUM,** Lansing, MI (517) 485-8115. "HERO" the robot entertains visitors with songs and tricks. Try a computer program that teaches the physical dynamics of slides, swings and balances. See a film on robotics.

16 **MUSEUM OF SCIENCE AND INDUSTRY,** Chicago, IL (312) 684-1414. Go for a walk down the high-tech highway in "Technology: Chance or Choice," an exhibit that examines 50 years of technology. Visit "Eliza"—the first computer psychoanalyst.

17 **SCIENCE MUSEUM OF MINNESOTA,** St. Paul, MN (612) 221-9488. Watch "Lasers: The Light Fantastic"—a demonstration of how these amazing beams work. Experiment with a voice synthesizer and "Turtle," a simple robot.

THE SOUTHEAST

18 **AMERICAN MUSEUM OF SCIENCE AND ENERGY,** Oak Ridge, TN (615) 576-3200. Play games and take energy-related quizzes on one of the museum's 17 computers.

19 **EPCOT CENTER,** Walt Disney World, Lake Buena Vista, FL (305) 824-2222. The "Compute a Coaster" exhibit lets visitors use touch-screen computer graphics to create a roller coaster—and then take a simulated ride. SMRT-1 Robot will keep you jumping with its guessing games. See computer-generated 3-D movies and laser graphics, and learn how computers help run EPCOT.

20 **LOUISIANA WORLD EXPOSITION '84,** New Orleans, LA (504) 566-1984. Touch-screen computers throughout the fairgrounds guide visitors to restaurants and exhibits. The original space shuttle "Enterprise" is on display.

21 **MUSEUM OF ARTS AND SCIENCES,** Jacksonville, FL (904) 396-7062. Take a look at light—laser light. Meet "Mr. Torso," a computer-run exhibit that will teach you about your body.

22 **MUSEUM OF SCIENCE AND INDUSTRY,** Tampa, FL (813) 985-5531. Create your own thunderstorm on the computer, learn

"Lefty" plays checkers at the Omniplex.

how tornadoes occur, visit the sun. Test your knowledge of weather and electricity on one of the museum's eight terminals.

23 ***SCIENCE MUSEUM AND PLANETARIUM OF PALM BEACH COUNTY,*** West Palm Beach, FL (305) 832-1988. Say hello to "Sir Plus," a tour-giving robot. Play games or program in the "Computer Learning Center."

MIDDLE ATLANTIC STATES

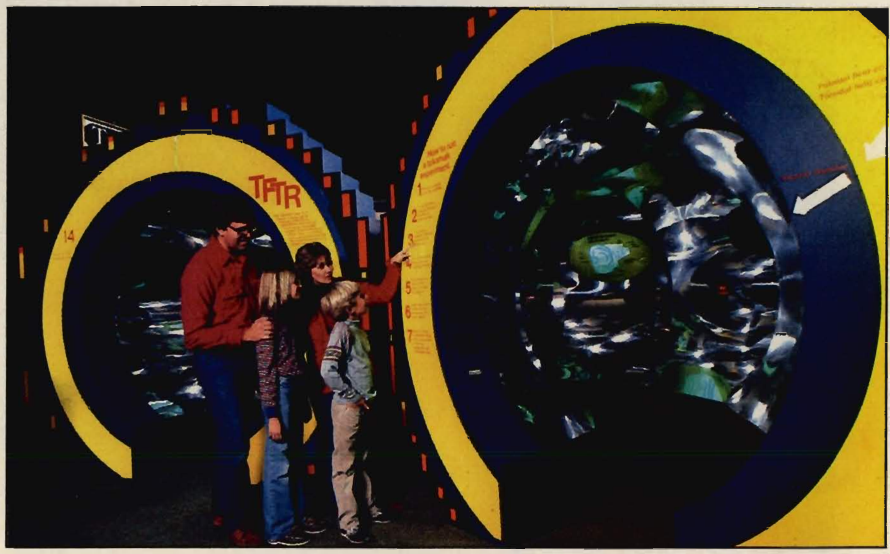
24 ***BUHL PLANETARIUM AND INSTITUTE OF POPULAR SCIENCE,*** Pittsburgh, PA (412) 321-4300. Finger paint on a computer screen with "Pixel Paintpots." Try one of 24 micros available for public use.

25 ***CAPITAL CHILDREN'S MUSEUM,*** Washington, D.C. (202) 543-8600. Meet "Wisecracker," a computer that'll crack you up. Play music, draw and learn geography with pre-programmed computers.

26 ***FRANKLIN INSTITUTE SCIENCE MUSEUM,*** Philadelphia, PA (215) 564-3375. Computer simulation programs let you make all critical decisions as you fly an airplane.

27 ***MARYLAND SCIENCE CENTER,*** Baltimore, MD (301) 685-2370. How do computers work? Find out at "The Computer Company." Meet "Dr. Know," a computer that can help solve all your problems.

28 ***NATIONAL AIR AND SPACE MUSEUM,*** Washington, D.C. (202) 357-1300. Take a trip into space on the shuttle. Surround yourself with space technology, from the Wright Brothers up to today.


© RICHARD DUNOFF

Confused about fusion? Visit "Tokomack" at the Franklin Institute.

29 ***NATIONAL MUSEUM OF NATURAL HISTORY,*** Washington, D.C. (202) 357-1300. Travel back in time and see antique computers, including the famous ENIAC and a room-sized Burroughs computer.

30 ***SCIENCE MUSEUM OF VIRGINIA,*** Richmond, VA (804) 257-0000. A computer-graphics projection system revolutionizes the planetarium here. Look at the heavens from many perspectives.

31 ***SESAME PLACE,*** Langhorne, PA (215) 757-1100. Check out "The Computer Gallery" where 32 pre-programmed computers help you learn while you play logic and word games.

Don't miss the computer-simulated light show in the "Rainbow Room," where your movements are captured and replayed in brightly colored light.

THE NORTHEAST

32 ***BOSTON CHILDREN'S MUSEUM,*** Museum Wharf, Boston, MA (617) 426-8855. "HI" program introduces visitors to computers. Play games on DEC computers.

33 ***THE DISCOVERY CENTER,*** Syracuse, NY (315) 425-9068. An early home video game, encased in clear plastic, lets you see its microprocessor.

34 ***MUSEUM OF HOLOGRAPHY,*** New York, NY (212) 925-0526. Famous people captured here in holograms. See rare holograms from all over the world.

35 ***MUSEUM OF SCIENCE,*** Boston, MA (617) 723-2500. Learn about the ancestors of today's personal computers. Play games and experiment with programs.

KATHERINE DURSO writes about science and technology in Washington D.C.

PHOTOS © DOUG MENUEZ

IIc or Not IIc?

A PREVIEW OF APPLE'S NEW PORTABLE COMPUTER

BY SUSAN MEYERS AND DAN LHAMON

It was like a scene from a cloak-and-dagger spy movie. We were sworn to secrecy and whisked to the sixth floor of Apple Headquarters in Cupertino, California. There we were shown into the Baltic Ave. room (every room in Apple HQ is named after a square on the *Monopoly* board). Finally, after being "briefed" by engineers and designers, we were given a sneak preview of Apple's newest product—the Apple IIc portable.

The IIc was introduced to us by Apple press people as "the machine families across America are waiting for." They also called it the "cuddliest" computer ever to hit the market. We're not sure what they mean by that. In fact, we didn't get much of a chance to "cuddle" it, or use it in private, so this is not a hands-on review. But we definitely liked what we did see of the IIc.

WHAT YOU GET

Basically, the Apple IIc is a portable and upgraded version of the Apple IIe. The Apple engineers have squeezed a 128K computer, a keyboard, and one disk drive into a trim white plastic box the size of a briefcase. The whole thing, which comes with a carrying handle, weighs just *seven* pounds. (The power supply, which does not fit in the case, is another two lbs.)

The IIc is being sold in a package that also includes an RF modulator and cables for hooking up a monitor or TV, built-in Applesoft BASIC, and tutorial disks and manuals. Although the price had not been

BASIC TRAINING

PROGRAMS FOR YOUR COMPUTER

Apple, Atari, Commodore 64, IBM PC, TI 99/4A, Timex-Sinclair, TRS-80 Color Computer, VIC 20

BAS-IC (To the tune of "BEAT IT")

Your friends are talking, you don't know what they mean,
It's all about computers, it's a whole new scene,
You wanna be a whiz kid—not just another teen,
It's BASIC, don't you know what I mean?
(Chorus)
Learn BASIC! Just BASIC!
Otherwise, you'll have to fake it.
Program that computer,
Till you get it right,
It doesn't matter,
Could be day or night,
It's BASIC,
Just BASIC,
It's BASIC,
Just BASIC (Whoo!).

The programs in this month's BASIC Training will help you animate computer graphics, keep time in Binary numbers, improve your spelling, and let you play a game. We also have the results to our Challenge #3, and a new Challenge for all of you up-and-coming software engineers.

In fact, the only thing we didn't have was something that would help you dance. Which is why we included our version of Michael Jackson's "Beat It." Now we've got everything—except a video on MTV. Well, maybe next month.

—*Richard Chevat, Technical Editor*

INVISIBLE VIDEO: TIMEX-SINCLAIR 1000, 1500

This program lets your computer write with invisible ink. By moving the blinking cursor with the 5, 6, 7, or 8 keys, you can leave a trail of characters on the screen. But all you see is the cursor.

Your Timex keeps track of every character you draw by putting it in the correct spot in the Q$ array (in line `110`). Just hit the "Z" key and your computer will print out the contents of the array on the screen (lines `240-260`). You can then continue drawing invisibly.

You can change the character you are drawing by following these steps: 1) press "A"; 2) type the new character the way you normally would (it will appear in the prompt in the lower left hand corner); 3) press ENTER again (to change to a graphics character, you press ENTER twice).

Just remember, this is *not* real invisible ink. You don't have to hold your TV over a candle to see the secret message.

```
10  REM INVISIBLE VIDEO
20  REM ARRAY FOR SCREEN
30  DIM Q$(22,32)
40  LET Q$(1)=
    " INVISIBLE VIDEO "
50  LET X=15
60  LET Y=11
70  LET X$="■"
80  REM PRINT CURSOR
90  PRINT AT Y,X;X$
100 REM SAVE
110 LET Q$(Y+1,X+1)=X$
120 LET A$=INKEY$
130 PRINT AT Y, X;"  "
140 REM NEW COORDINATES
150 LET X=X+(A$="8")
      -(A$="5")
160 LET Y=Y+(A$="6")
      -(A$="7")
170 IF X>31 THEN LET X=31
180 IF X<0 THEN LET X=0
190 IF Y>21 THEN LET Y=21
200 IF Y<2 THEN LET Y=2
210 IF A$="A" THEN
    GOTO 280
220 IF A$="Z" THEN
    GOTO 240
230 GOTO 80
240 FOR I=1 TO 22
250 PRINT AT I-1, 0;Q$(I)
260 NEXT I
270 GOTO 80
280 INPUT A$
290 LET X$=A$
300 GOTO 80
```

—*Michael Allen*

(BASIC Training continues on next page)

BASIC TRAINING

BINARY CLOCK:

ATARI, COMMODORE 64, IBM, TRS-80 COLOR COMPUTER, VIC-20

Everybody knows that computers use binary numbers. But can you write a program using them? Here's one that will help you learn about binary numbers and also teach you how to use your computer's timing feature. It displays the time in binary and decimal numbers.

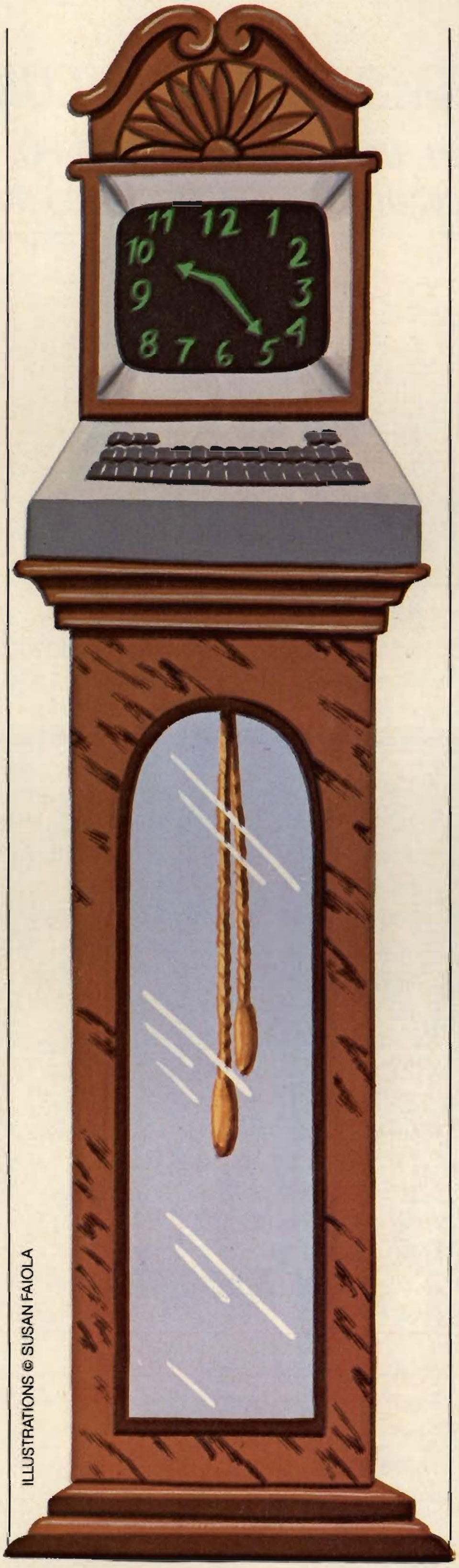
In the VIC and COMMODORE versions, the timer is read with the TI$ function, which gives you six decimal digits. The first two digits count the hours, the next two the minutes, and the last two count seconds. You get the current value of the timer in line **80**. (On the IBM, the timer is called TIME$).

The timer starts at zero when you turn on your computer. (You can set the timer to the actual time with the INPUT statement in line **30**.) Lines **90–110** slice off the digits for hours, minutes and seconds. Subroutine 500 converts the decimal numbers to binary.

The TRS-80 timer works a little differently. It counts from zero to 65535, changing every sixtieth of a second (approximately). So our program first adds up these sixtieths of a second in line **160**. Then it has to convert them into seconds in line **190**.

The timer on the ATARI is also a memory location that changes every sixtieth of a second. But it only counts to 256. You read the timer with the PEEK command in line **140**. This version also makes a small beep every second.

Once you learn how to use the timer on your computer, you can write a time limit into your next game program, or create a program that tests someone's reflexes. But, don't use it to create an alarm clock. Your teacher won't buy the excuse, "My computer didn't go off."



ILLUSTRATIONS © SUSAN FAIOLA

NOTE: s means hold down the SHIFT key and press CLR. S means press the HOME key.

VIC 20:

```
10  REM BINARY CLOCK
20  PRINT"s"
30  INPUT "SET TIME —
    HHMMSS";TI$
40  PRINT "s"
50  PRINT TAB(8)"CLOCK"
60  PRINT:PRINT
70  PRINT "BINARY";
    TAB(15)"DECIMAL"
75  REM TI$=TIMER
80  T$=TI$
90  HOUR$=MID$(T$,1,2)
100 MIN$=MID$(T$,3,2)
110 SEC$=MID$(T$,5,2)
120 PRINT"S":PRINT
130 PRINT:PRINT:PRINT
135 REM X=VALUE TO BE
    CONVERTED TO
    BINARY:Y$=DECIMAL
140 X=VAL(SEC$)
150 X$="SECONDS":
    Y$=SEC$
160 GOSUB 500
170 X=VAL(MIN$)
180 X$="MINUTES":
    Y$=MIN$
190 GOSUB 500
200 X=VAL(HOUR$)
210 X$="HOURS":
    Y$=HOUR$
220 GOSUB 500
230 IF TI$=T$ THEN GOTO
    230
240 GOTO 80
500 REM CONVERT TO
    BINARY
510 B=0:IF X>=32 THEN
    X=X-32:B=1
520 C=0:IF X>=16 THEN
```

(Program continues on next page)

set, Apple told us the IIc would probably go for around $1,200.

Since the IIc is like the IIe in many ways, we're going to report on the features that are different.

PORTABILITY: At nine pounds total, the IIc is definitely easy to carry around. The problem right now is that there's no monitor included—you either have to find a handy TV or monitor, or carry one around with you. But this should only be a temporary problem, since Apple promises that in September they will start selling a flat display screen (similar to ones found on notebook-sized computers). It will be only a couple of inches wide, will fit on top of the IIc and will display 24 lines with 80 columns of text.

MEMORY: With 128K, the IIc comes with twice as much memory as the IIe. This is more than enough for most home uses and for many business applications.

KEYBOARD: The IIc has the same keyboard layout as the IIe. For someone like Dan, who has used the IIe, this was a nice feature. Although the keys are closer together than on the IIe, we found them comfortable to use.

Unlike any other computer we've seen, this Apple gives you the ability to switch to a different keyboard configuration—something called the Dvorak keyboard. It seems that the traditional keyboard layout was designed in prehistoric times in order to *slow down* typists, since the old typewriters couldn't keep up. By flicking the Dvorak switch and rearranging IIc's detachable keys, you can use a layout that's much faster. Whether anyone will want to however, remains to be seen.

DISPLAY: Another switch on the IIc lets you go from 40-column display to 80-column (but not while the computer is on).

There are 16 colors. Because of the 128K RAM, *all* of them can be displayed on the screen at the same time. The IIc also has an ultra-high resolution mode (590 x 192 dots), making for high quality graphics.

SOUND: IIc is full of handy switches and gizmos. There's a volume control and an audio jack on the side of the case. Plug in a set of headphones and the sound effects of your favorite game will be heard only by you. Otherwise, the sound on the IIc is the same as the IIe, which means it is not a music-making machine like the Commodore 64, but it *can* play tunes.

PERIPHERALS: We saw several peripherals at our sneak preview. There is an external disk drive you can add, and a small 9" IIc monitor.

A peripheral we especially liked was the mouse that was hooked up for us. Our hosts said one would be available for about $40.

Unlike the IIe, the IIc does not have any expansion slots. We didn't think this was much of a disadvantage, since it already has 128K and there are built-in ports in the back of the computer where you can plug in a mouse, joystick, printer or other peripheral. In fact, this set-up is a lot easier than opening up your computer and plugging in boards.

Dan draws an apple on the Apple IIc.

SOFTWARE: Of course, one of the biggest pluses of the IIc is that it will run 90 percent of all IIe software.

Apple had one software package on display, called *MousePaint*, that was written specifically for the IIc and—you guessed it—a mouse. While Apple marketing people were distracted, Dan got a chance to actually use it for a little while. He drew an Apple logo, which really made our hosts happy. We thought *MousePaint* was a very good graphics program and a lot of fun to use.

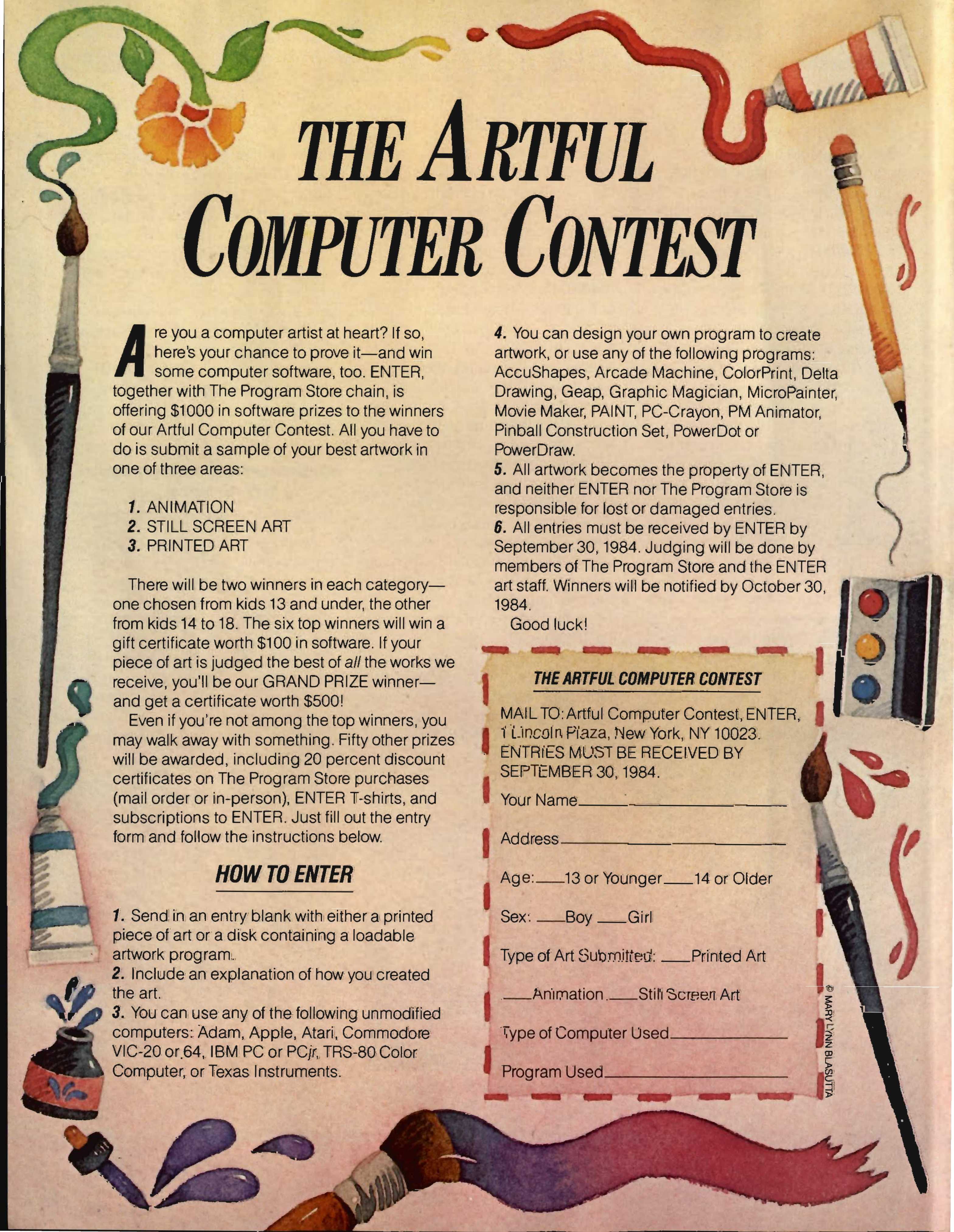
II BUY OR NOT II BUY?

At $1,200, the IIc will be priced about equally with the IIe. (For the same money you could get a IIe with a monitor, but not 128K and the expansion ports.) It seems to be designed to compete with the IBM PC*jr*, and like the PC*jr*, part of what you're paying for is the large software market and the support Apple gives its products.

We can't give a complete recommendation until we get a chance to use a IIc for an extended period of time. But there were a lot of things we liked about this new Apple. It has plenty of memory, it's easy to add on peripherals, and it already has an enormous software library. Also, when the flat screen becomes available, the IIc will be usable as a portable or a regular home computer.

With these options, the IIc may turn out to be one of the best buys in a mid-priced home computer.

SUSAN MEYERS is ENTER's west coast editor. DAN LHAMON, 14, is a member of the ENTER Youth Advisor Board.



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THE ARTFUL COMPUTER CONTEST

Are you a computer artist at heart? If so, here's your chance to prove it—and win some computer software, too. ENTER, together with The Program Store chain, is offering $1000 in software prizes to the winners of our Artful Computer Contest. All you have to do is submit a sample of your best artwork in one of three areas:

1. ANIMATION
2. STILL SCREEN ART
3. PRINTED ART

There will be two winners in each category—one chosen from kids 13 and under, the other from kids 14 to 18. The six top winners will win a gift certificate worth $100 in software. If your piece of art is judged the best of *all* the works we receive, you'll be our GRAND PRIZE winner—and get a certificate worth $500!

Even if you're not among the top winners, you may walk away with something. Fifty other prizes will be awarded, including 20 percent discount certificates on The Program Store purchases (mail order or in-person), ENTER T-shirts, and subscriptions to ENTER. Just fill out the entry form and follow the instructions below.

HOW TO ENTER

1. Send in an entry blank with either a printed piece of art or a disk containing a loadable artwork program.
2. Include an explanation of how you created the art.
3. You can use any of the following unmodified computers: Adam, Apple, Atari, Commodore VIC-20 or 64, IBM PC or PC*jr*, TRS-80 Color Computer, or Texas Instruments.
4. You can design your own program to create artwork, or use any of the following programs: AccuShapes, Arcade Machine, ColorPrint, Delta Drawing, Geap, Graphic Magician, MicroPainter, Movie Maker, PAINT, PC-Crayon, PM Animator, Pinball Construction Set, PowerDot or PowerDraw.
5. All artwork becomes the property of ENTER, and neither ENTER nor The Program Store is responsible for lost or damaged entries.
6. All entries must be received by ENTER by September 30, 1984. Judging will be done by members of The Program Store and the ENTER art staff. Winners will be notified by October 30, 1984.

Good luck!

THE ARTFUL COMPUTER CONTEST

MAIL TO: Artful Computer Contest, ENTER,
1 Lincoln Plaza, New York, NY 10023.
ENTRIES MUST BE RECEIVED BY
SEPTEMBER 30, 1984.

Your Name ____________________

Address ____________________

Age: ____ 13 or Younger ____ 14 or Older

Sex: ____ Boy ____ Girl

Type of Art Submitted: ____ Printed Art

____ Animation ____ Still Screen Art

Type of Computer Used ____________________

Program Used ____________________

(Program continued from previous page)

```
    X=X-16:C=1
530 D=0:IF X>=8 THEN
    X=X-8:D=1
540 E=0:IF X>=4 THEN
    X=X-4:E=1
550 F=0:IF X>=2 THEN
    X=X-2:F=1
560 G=0:IF X=1 THEN G=1
570 PRINT X$
575 REM PRINT TIME
580 PRINT B;C;D;E;F;G;
    TAB(20)Y$
590 RETURN
```

COMMODORE 64: Use the VIC 20 version, delete line **580**. Replace these lines:

```
50  PRINT TAB(12)"CLOCK"
70  PRINT TAB(8)"BINARY";
    TAB(30)"DECIMAL"
570 PRINT X$;B;C;D;E;F;G;
    TAB(30)Y$
```

IBM PC AND PC JR.: Use VIC 20 version, delete line **580**. Add or replace these lines:

```
20  CLS
30  INPUT "SET TIME —
    HH:MM:SS";T$
40  CLS: TIME$=T$
50  PRINT TAB(12)"CLOCK"
70  PRINT TAB(8)"BINARY";
    TAB(30)"DECIMAL"
80  T$ = TIME$
90  HOUR$ = MID$(T$,1,2)
100 MIN$ = MID$(T$,4,2)
110 SEC$ = MID$(T$,7,2)
120 PRINT CHR$(11):PRINT
230 IF TIME$ = T$ GOTO 230
570 PRINT X$;B;C;D;E;F;G;
    TAB(30)Y$
```

TRS-80 COLOR COMPUTER:

```
10  REM BINARY CLOCK
20  CLS:TIMER=0
30  INPUT "SET
    HOURS";HOUR
40  INPUT "SET
    MINUTES";MIN
50  INPUT "SET
    SECONDS";SEC
60  CLS
70  PRINT@70, "BINARY
    CLOCK"
80  PRINT@130, "SECONDS"
90  PRINT@162, "MINUTES"
100 PRINT@194, "HOURS"
110 PRINT@354, "HOURS
    MINUTES SECONDS"
120 PT=TIMER
130 REM PT=PREVIOUS TIME
140 T=TIMER
145 REM IF TIMER HAS GONE
    PAST 65535
150 IF T<PT THEN
    ET=ET+T+65536-PT:
    GOTO 170
155 REM ET=ELAPSED TIME
160 ET=ET+(T-PT)
170 PT=T
180 IF ET<60 THEN GOTO 140
185 REM ADD SECONDS
190 SEC=SEC+INT(ET/60)
195 REM SAVE FRACTIONS OF
    SECONDS
200 ET=ET/60-INT(ET/60)
210 REM DECIMAL VALUES
220 IF SEC>=60 THEN
    SEC=SEC-60:
    MIN=MIN+1
230 IF MIN>=60 THEN
    MIN=MIN-60:
    HOUR=HOUR+1
240 IF HOUR>=24 THEN
    HOUR=0
250 PRINT@387, HOUR
260 PRINT@394, MIN
270 PRINT@402, SEC
280 Y=140
290 X=SEC:GOSUB 500
300 X=MIN:GOSUB 500
310 X=HOUR:GOSUB 500
320 GOTO 140
500 REM CONVERT TO
    BINARY
510 B=0:IF X>=32 THEN
    X=X-32:B=1
520 C=0:IF X>=16 THEN
    X=X-16:C=1
530 D=0:IF X>=8 THEN
    X=X-8:D=1
540 E=0:IF X>=4 THEN
    X=X-4:E=1
550 F=0:IF X>=2 THEN
    X=X-2:F=1
560 G=0:IF X=1 THEN G=1
570 PRINT@Y,B;C;D;E;F;G
580 Y=Y+32
590 RETURN
```

ATARI: Use the TRS-80 version. Delete lines **250** and **260**. Add or replace these lines:

```
15  POKE 752,1
20  ? CHR$(125)
30  ? "SET HOURS: ";
35  INPUT HOUR
40  ? "SET MINUTES: ";
45  INPUT MIN
50  ? "SET SECONDS: ";
55  INPUT SEC
60  ? CHR$(125)
65  POSITION 15,1
70  ? "CLOCK"
75  POSITION 12,3
80  ? "BINARY"
85  POSITION 26,3
90  ? "DECIMAL"
95  ?:? "SECONDS"
100 ?:? "MINUTES"
110 ?:? "HOURS"
120 PT= PEEK(20)
140 T=PEEK(20)
150 IF T<PT THEN
    ET=ET+T+256-PT:
    GOTO 170
270 SOUND 0,100,10,2
275 SOUND 0,0,0,0
280 Y=5:H=SEC
295 H=MIN
305 H=HOUR
565 POSITION 12,Y.
570 ? B;C;D;E;F;G,,H;"  "
580 Y=Y+2
```

—Daniel Cohn

(BASIC Training continues on next page)

(BASIC Training cont. from previous page)

BASIC GLOSSARY: PEEKS AND POKES

The BASIC words PEEK and POKE do exactly what they say.

POKE stores a number in your computer's memory. Its syntax, or format, is the word POKE and two numbers separated by a comma. The first number is a location in your computer's memory. The second number is an integer (whole number) that you want to store there. You can also use variables or an arithmetic expression to represent the numbers.

A good example of a POKE is this line from this issue's "Wonder Walker" program for the Commodore 64: **20 POKE 53280,12**. Here's what it means: Memory location 53280 holds the code for the color of the screen's border. The number 12 is the code for light gray. So, by placing (or POKEing) the number 12 in location 53280, you set the border color to light gray.

PEEK is the opposite of POKE. It allows you to look (PEEK) at the contents of a memory location. Its syntax is: PEEK followed by a number or variable in parentheses. This number or variable represents the memory location you want to look at.

Most of the time, you use PEEK with other commands. For example, in the Atari version of the "Binary Clock" program, line 140 is: **T = PEEK(20)**. Memory location 20 is a timer that changes every sixtieth of a second. PEEK(20) returns an integer (whole number) between 0 and 255.

WORD BREAKER
TI 99/4A

This program can be used as a spelling quizzer or as the basis for word game. It takes words that you have entered and displays them one at a time. After you have had a chance to study the word for a few seconds, the program scatters the letters all over the screen and challenges you to spell the word correctly.

"Word Breaker" is a good example of how to use subroutines to solve complex programming problems.

```
5     CALL CLEAR
10    CALL SCREEN(8)
20    INPUT "TYPE THE
      NUMBER OF WORDS
      TO STUDY.  ":NW
25    OPTION BASE 0
30    DIM SP$ (200)
35    DIM NS (100)
40    GOSUB 1000
50    FOR I = 1 TO NW
60    TA = 0
70    CALL CLEAR
80    CALL SCREEN(8)
90    GOSUB 2000
100   GOSUB 2100
110   GOSUB 2200
120   GOSUB 2300
140   IF TA = 1 THEN 70
150   CALL CLEAR
160   CALL SCREEN(8)
170   NEXT I
180   REM DONE WITH TEST
190   PRINT "DO YOU WANT
      TO STUDY?"
200   INPUT "THE WORDS
      AGAIN Y/N": YN$
210   IF YN$ = "Y" THEN 50
220   END
1000  FOR I = 1 TO NW
1010  PRINT "ENTER WORD"; I
1020  INPUT SP$(I)
1030  NEXT I
1040  RETURN
2000  REM PRINT WORD
2010  LW = LEN (SP$(I))
2020  FOR J = 1 TO LW
2030  X$ = SEG$(SP$(I),J,1)
2040  X = ASC(X$)
2050  CALL HCHAR (11,
      11 + J,X,1)
2060  NEXT J
2070  RETURN
2100  REM CLEAR NS ARRAY
2110  FOR K = 1 TO LW
2120  NS(K) = 0
2130  NEXT K
2140  RETURN
2200  REM RANDOMIZE
2210  FOR K = 1 TO LW
2220  R = INT(LW*RND) + 1
2225  FL = 0
2230  FOR L = 1 TO LW
2240  IF (NS(L)) = (R) THEN
      2245 ELSE 2250
2245  FL = 1
2250  NEXT L
2260  IF FL = 1 THEN 2220
2270  NS(K) = R
2280  NEXT K
2290  RETURN
2300  REM BREAKUP WORD
2310  FOR M = 1 TO LW
2320  CALL HCHAR
```

(Program continues on next page)

(Program continued from previous page)

```
     (11,11+NS(M),32,1)
2330 XR=INT (30*RND)+1
2335 IF XR < 3 THEN 2330
     ELSE 2340
2340 YR=INT(20*RND)+1
2345 IF YR=11 THEN 2340
2350 IF YR < 6 THEN 2340
2355 LT$=SEG$(SP$(I),NS(M),1)
2360 LT=ASC(LT$)
2370 CALL HCHAR (YR,
     XR,LT,1)
2380 NEXT M
2410 PRINT "TYPE THE
     WORD THAT YOU"
2420 INPUT "JUST
     STUDIED:   ":WD$
2440 TA=0
2450 IF WD$=SP$(I) THEN
     2500
2460 PRINT "THAT IS
     INCORRECT"
2470 PRINT "TRY AGAIN"
2480 FOR DE=1 TO 700
2485 NEXT DE
2490 TA=1
2495 GOTO 2530
2500 PRINT "THAT IS
     CORRECT"
2510 FOR DE=1 TO 700
2520 NEXT DE
2530 RETURN
```

—*Jeff Nilson*

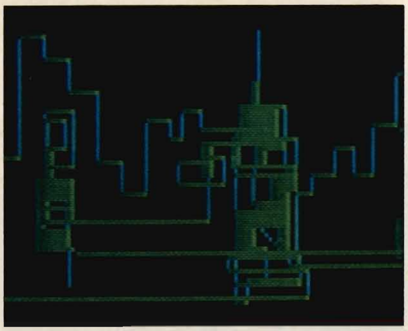
THE GREAT FLOOD: ATARI

This program creates a flood—but you won't get wet using it. Instead, you can use this program to "flood," or fill up, an area of your TV screen with color.

In the first part of the program, lines **90** to **200**, you use your joystick to draw an outline on the screen. It can be any size or shape, but it must be a totally enclosed area. Once you have finished, position the cursor *inside* your shape, and hit the joystick's trigger. Your outline will fill up with color.

This is done in lines **210** to **420**. "Flood" moves up and to the left, point by point, from where you last positioned the cursor (lines **300** and **320**.) When it hits a line, it colors in that point and moves right or down. It keeps going until the entire shape is filled in. Then it returns to the first part of the program and lets you draw a new shape. Line **290** saves the location of points the program will need to return to, so it won't "paint itself into a corner."

Once you've used "Flood" a little, see if you can improve it by allowing you to "flood" in different colors. And if animals start appearing two by two, it's time to turn off your Atari.



```
10  DIM S(100):X= 80
20  Y=40:C=2:GRAPHICS 7
30  COLOR C:PLOT X,Y
40  PLOT 0,0
50  DRAWTO 159,0
60  DRAWTO 159,79
70  DRAWTO 0,79
80  DRAWTO 0,0
85  REM DRAW SHAPE
90  G = STICK(0)
100 IF STRIG(0)=0 THEN 210
110 IF G=15 THEN 90
120 IF G=14 OR G=10 OR
    G=6 THEN Y=Y-1
130 IF G=13 OR G=9 OR G=5
    THEN Y=Y+1
140 IF G=11 OR G=10 OR
    G=9 THEN X=X-1
150 IF G=7 OR G=6 OR G=5
    THEN X=X+1
160 IF X < 1 THEN X=1
170 IF X > 158 THEN X=158
180 IF Y < 1 THEN Y=1
190 IF Y > 78 THEN Y=78
200 PLOT X,Y:GOTO 90
210 REM START FLOOD
220 G = 0:COLOR 0
230 PLOT X,Y:COLOR C
240 POSITION 2,20
250 PRINT X,Y,G
260 LOCATE X+1,Y+1,N
270 LOCATE X,Y+1,N1
280 LOCATE X+1,Y,N2
285 REM SAVE POINT IF
    NECESSARY
290 IF N=C AND N1=0 AND
    N2=0 THEN G=G+1:
    S(G)=X* 256+Y
295 REM MOVE TO BORDER
300 LOCATE X-1,Y,N
310 IF N=0 THEN
    X=X-1:GOTO 240
320 LOCATE X,Y-1,N
330 IF N=0 THEN
    Y=Y-1:GOTO 240
340 LOCATE X+1,Y,N
350 IF N=0 THEN PLOT
    X,Y:X=X+1: GOTO 240
360 LOCATE X,Y+1,N
370 IF N=0 THEN PLOT
    X,Y:Y=Y+1: GOTO 240
380 PLOT X,Y
390 IF G=0 THEN PRINT
    "DONE":GOTO  90
400 X=INT(S(G)/256)
410 Y=S (G)-X*256
420 G=G-1:GOTO 240
```

—*David Lewis*

(BASIC Training continues on next page)

BASIC TRAINING

(BASIC Training cont. from previous page)

CHALLENGE #6: LET THE GAMES BEGIN

In case there's anyone who doesn't know it, the summer Olympic games are being held in Los Angeles this year. So, here at ENTER, we decided to stage our own Olympics. Except these games are going to be written by you, and played on a computer.

They can be any kind of games—word games, guessing games, logic games, maze games or number games. If you can play it on a computer, we'd like to see it.

Entries can be for any home computer, but remember, keep them under 75 lines if you want to see them in ENTER. Also, remember to include a note telling us your name, age, T-shirt size, the type of computer your program was written for, and a brief description of what it does. If we pick your program, we'll send you $50 and an ENTER T-shirt.

Send your program to: CHALLENGE # 6, ENTER, CTW, 1 LINCOLN PLAZA, NY, NY, 10023

All entries must be postmarked no later than July 31. We read every single program that is sent to us, but because of the hundreds of entries we get, we cannot respond to everyone.

Also remember that ENTER is always looking for a few good programs. If you have one, send it to BASIC TRAINING at the above address. If we use it, we will also send you $50 and an ENTER T-shirt.

ANSWERS TO CHALLENGE #3: MOVING PICTURES

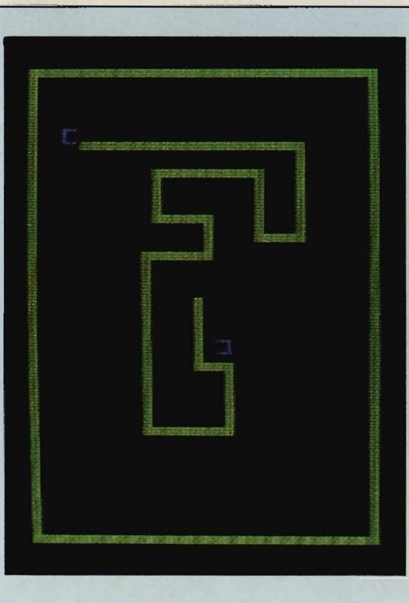
In Challenge #3, we asked you to send us your best computer animation program. Judging by the amount of mail we got, it looks like a lot of you are planning to be the next Walt Disney or Don Bluth. So, here are the winners.

Don't forget—there's a new Challenge every month.

SNAKE PIT: APPLE

This program was submitted by John Elliot, 13 years old, of Snyder, N.Y. We liked this one because it was a complete game.

The object is to move your snake around the screen, using the "A" key to move up, the "Z" key to move down and the right and left cursor keys to move sideways. Each square you eat makes your snake grow. But if you hit a wall or your own tail, you lose.



```
10   REM SNAKE
15   HOME : HGR
20   HCOLOR= 3
30   ROT= 0: SCALE= 1
40   DIM ST%(800,1)
50   FOR X = 1 TO 23
60   READ P
70   POKE 767 + X,P
80   NEXT
90   DATA 2,0,6,0,13,0,45,53,
     63,55,45,53,0
100  DATA 45,45,53,54,62,63,63,
     36,36,0
110  POKE 232,0: POKE 233,3
120  FOR X = 72 TO 204 STEP 4
130  DRAW 1 AT X,2: NEXT
140  FOR X = 72 TO 204 STEP 4
150  DRAW 1 AT X,155: NEXT
160  FOR Y = 3 TO 154 STEP 3
170  DRAW 1 AT 72,Y: NEXT
180  FOR Y = 3 TO 154 STEP 3
190  DRAW 1 AT 204,Y: NEXT
200  X = 140:Y = 80:L = 1:
     N = 1:C = 1:DI = 1
210  ST%(N,0)=X:ST%(N,1)=Y
220  N = N + 1: IF N = 801
     THEN N = 1
230  XDRAW 1 AT X,Y:CL =
     PEEK (234)
240  XDRAW 1 AT X,Y
250  IF CL = 0 THEN 610
260  IF CL < > 12 THEN PRINT
     CHR $ (7);
270  IF CL < > 12 THEN XC =
     1:LL = LL + 5:C = C + 5
280  IF CL < > 12 THEN VTAB
     23: HTAB 10
```

(Program continues on next page)

(Program continued from previous page)

```
290 IF CL < > 12 THEN PRINT
     “SCORE:  ”; LL;
300 GOSUB 480
310 DRAW 1 AT X,Y
320 IF C = 0 THEN XDRAW 1
     AT ST%(L,0),ST%(L,1)
330 IF C = 0 THEN L = L + 1
340 IF L = 801 THEN L = 1
350 IF C > 0 THEN C = C - 1
360 K = PEEK ( - 16384)
370 IF K < 128 THEN 430
380 POKE - 16384,0
390 IF K = 193 THEN DI = 1
400 IF K = 149 THEN DI = 2
410 IF K = 218 THEN DI = 3
420 IF K = 136 THEN DI = 4
430 IF DI = 1 THEN Y = Y - 3
440 IF DI = 2 THEN X = X + 4
450 IF DI = 3 THEN Y = Y + 3
460 IF DI = 4 THEN X = X - 4
470 GOTO 210
480 IF XC > 1 THEN XC =
     XC - 1: GOTO 600
490 IF XC = 1 THEN XDRAW 2
     AT XX,YY
500 XC = 0
510 RR = INT ( RND (1) * 10)
520 IF RR < > 0 THEN 600
530 XX = INT ( RND (1) * 123)
     + 76
540 YY = INT ( RND (1) * 151)
     + 3
550 XDRAW 2 AT XX,YY:CL =
     PEEK (234)
560 XDRAW 2 AT XX,YY
570 IF CL < > 18 THEN 530
580 DRAW 2 AT XX,YY
590 XC = 50
600 RETURN
610 VTAB 23: HTAB 1: PRINT
     “CRASH”
620 PRINT “PLAY AGAIN?”;
630 VTAB (24): HTAB (13): GET
     YN$
640 IF YN$ = “Y” THEN RUN
650 IF YN$ = “N” THEN TEXT
     : HOME : END
660 GOTO 630
```

—John Elliott

WONDER WALKER: COMMODORE 64

The hero of this cartoon is not very super. He just walks across the screen with the loudest footsteps a one-inch man ever made. But this program is a good example of how to use the sprite chip in the Commodore. Once you've mastered this program, which uses two sprites, you can move on to more complicated action. Our super walker was submitted by Eric Blake, age 14, of Atlanta, Georgia.

NOTE: The symbol “s” means hold down the SHIFT key and press CLR.

```
10  REM WALKER
20  POKE 53280,12
30  POKE 53281,15
40  S=54272
50  POKE S+24,15
60  POKE S,220
70  POKE S+1,68
80  POKE S+5,15
90  POKE S+6,215
100 POKE S+7,120
110 POKE S+8,100
120 POKE S+12,15
130 POKE S+13,215
140 PRINT “s”
150 V=53248
160 POKE V+21,1
170 REM LOAD WALKER DATA
180 PRINT  TAB (160)
190 FOR A1=12288 TO 12350
200 READ B1:POKE A1,B1
210 NEXT
220 FOR A2=12352 TO 12414
230 READ B2:POKE A2,B2
240 NEXT
250 POKE V+28,1
260 POKE V+37,10
270 POKE V+38,9
280 POKE V+39,5
290 POKE V+1,168
300 P=192
310 FOR X=0 TO 347 STEP 8
320 RX=INT(X/256)
330 LX=X-RX*256
340 POKE V, LX
350 POKE V+16,RX
360 IF P=192 THEN GOSUB 510
370 IF P=193 THEN GOSUB
     540
380 POKE 2040,P
390 REM TIME DELAY
400 FOR T= 1 TO 300:NEXT
410 P=P+1
420 IF P>193 THEN P=192
430 NEXT
440 END
450 DATA 0,0,60,0,0,
     52,0,0,52,0,0,16,0,0, 252, 0,
     0, 236,0,0,236,0,0,
     236,0,0,236,0
460 DATA 0,236,0,0,236,0,0,
     152,0,0,168,0,0,168,0,0,
     40,0,0,40, 0,0,40,0,0,40,0
470 DATA 0,40,0,0,63,0,0,63,0
480 DATA 0,60,0,0,52,0,0,
     52,0,0,16,0,0,252,0,0,
     236,0,0,236,0,0, 236,0,0,
     233,0,0
490 DATA 233,0,0,252,0,0,
     168,0,0,168,0,0,168,0,14,
     168,0,14,168,0,14,168,0
500 DATA 14,168,0,12,40,0,
     12,63,0,0,63,0
510 POKE S+4,129
520 POKE S+4,128
530 RETURN
540 POKE S+11,129
550 POKE S+11,128
560 RETURN
```

—Eric Blake

SESAME STREET ORDER FORM

☐ Yes! Please send 1 year (10 issues) of Sesame Street for only $9.95.

☐ I prefer 2 years (20 issues) for only $18.95.

CHILD'S NAME ______ AGE ______

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CITY ______ STATE ______ ZIP ______

LIST BILLING NAME AND ADDRESS IF DIFFERENT FROM ABOVE.

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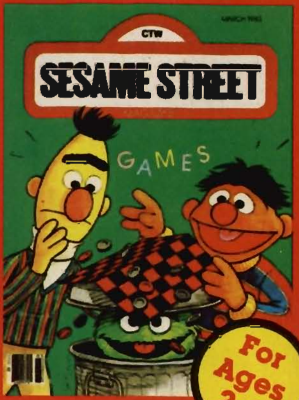
MAIL TO: Sesame Street Magazine
P.O. Box 2894, Boulder, CO 80322

Subscriptions to Canada and other countries, add $6.00 per year. Please remit in U.S. currency. Allow 6-8 weeks for delivery.

8HPD0

ENJOY WITH SESAME STREET



For Ages 2-6

Sesame Street Magazine—Big Bird and his delightful friends will bring dozens of playful surprises, ten terrific times a year. (It's the entertaining education that Sesame Street does best!) Puzzles, cut-outs, games, A-B-C's, 1-2-3's...there's all the magic of the TV super-series in every colorful issue.

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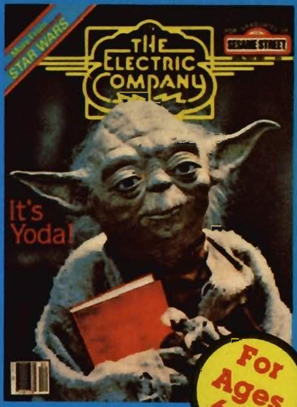
MAIL TO: The Electric Company Magazine
200 Watt Street, P.O. Box 2922, Boulder, CO 80322

Subscriptions to Canada and other countries, add $6.00 per year. Please remit in U.S. currency. Allow 6-8 weeks for delivery.

8HPE7

ENTERTAIN WITH ELECTRIC COMPANY



For Ages 6-10

The Electric Company Magazine—as creatively entertaining as the T.V. show kids love. It's amusing, playful, absorbing and educational for beginning and young readers. Enjoy ten colorful issues filled with puzzles, posters, cut-outs, Spidey super stories, jokes...and sunny smiles.

3-2-1 CONTACT ORDER FORM

☐ Yes! Please send 1 year (10 issues) of 3-2-1 Contact for only $10.95.

☐ I prefer 2 years (20 issues) for only $19.95.

CHILD'S NAME ______ AGE ______

ADDRESS ______

CITY ______ STATE ______ ZIP ______

LIST BILLING NAME AND ADDRESS IF DIFFERENT FROM ABOVE.

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______

☐ BILL ME LATER ☐ PAYMENT ENCLOSED

MAIL TO: 3-2-1 Contact
E=MC Square, P.O. Box 2931, Boulder, CO 80322

Subscriptions to Canada and other countries, add $6.00 per year. Please remit in U.S. currency. Allow 6-8 weeks for delivery.

8HPF5

EXPLORE WITH 3-2-1 CONTACT

3-2-1 CONTACT
Hang On!

For Ages 8-12

3-2-1 Contact—Science is fun. And you can make it a year-long learning adventure for your favorite 8-12 year olds. 3-2-1 Contact will bring ten big issues packed with puzzles, projects, experiments, questions and answers about the world around us. It's an involving, fun way to learn!

INPUT

ENTER POLL #5

We'd like to know about your experience with computers, and what you think of some of the articles in this month's ENTER. Your answers help us plan future issues, so please be honest. We'll send ENTER T-shirts to 50 of you, picked at random.

Mail your questionnaire by August 15 to: ***INPUT #5, ENTER Magazine, P.O. Box 777, Ridgefield, N.J. 07657***

I. Tell us about yourself:

Name____________________

Address____________________

City____________________State & Zip____________

Grade____Age____Male____Female____

T-shirt size: Kids L____Adult S____M____L____

Where did you get this issue of ENTER?

____In the mail____At a computer store____At a bookstore or newsstand____Other (explain)____________

____

II. We'd like to know about you and computers:

A. Does your family own a computer?

____Yes. Which kind?____Adam____Apple____Atari

____IBM____Commodore 64____VIC-20

____Timex/Sinclair____TRS-80 (model?)____________

____TI99/4A____ Other (Please indicate name and model)____________________

____No, but we plan to buy one in the near future. Which kind?____________________

____ No, we have no plans to buy one.

B. What peripherals does your family own? (Check all that apply)____Disk drive____Joysticks____Printer ____Cassette drive____Modem____ Touch Pad

____Other (explain) ____________________

____

C. Do you write your own programs?____Yes____No
What computer language do you use?____________________

D. Did you try any of the programs in this month's BASIC Training?____Yes____No. Which ones?____________

____

Did you get it to work? ____Yes ____No
Were the programs in this issue ____too easy ____just right____ too hard?

E. How many software packages do you buy each month? ____None ____1-3 ____4-10 ____More than 10

III. Tell us what you think about this issue's articles.

A. Did you read the story on *The Last Starfighter*?
____Yes ____No. If yes, what did you think of it?
____Liked it ____OK ____Didn't like it.
Do you plan to see the movie? ____Yes ____No

B. Did you read our Olympics section? ____Yes ____No
If yes, what did you think? ____Liked it ____OK
____Didn't like it.
Which story did you like best?____________________
Why?____________________
Which story did you like least?____________________
Why?____________________

C. Did you read the story on museums? If yes, what did you think? ____Liked it ____OK ____Didn't like it.
Do you plan on visiting any of the places mentioned in the article? ____Yes ____No. If yes, which ones?____________

____

D. Last, but not least: In future issues of ENTER, I'd like to read about____________________

____

____

____

____

NEXT

COMING IN OUR SEPTEMBER ISSUE:

MOVE OVER, INDIANA JONES: Ed Catmull has arrived in the land of *Star Wars* and *The Search for Spock*. He's pioneering a new age of computer movie-making at the studio that started it all—Lucasfilm. ENTER ventures behind-the-scenes for a look at his secrets—including some startling new computer games.

PORTABLE AND POWERFUL: Small is beautiful, but does it compute? Our expert team of teenage testers put the top portable computers through their paces. An ENTER Buyer's Guide to Portable Computing.

HOT COPIES & YOU: Here's your side of the story on whether it's OK or wrong to copy software. Our April 1984 "Hot Copies" gave you the pro and con—now we'll see where you stand on software piracy.

ROCK ON THE ROAD: Computers help bring razzle-dazzle excitement to rock 'n' roll tours. Find out how The Jacksons, Duran Duran and other hot acts are taking high-tech on the road.

WORD PROCESSING: What is it? What's the best software at the best price? A complete buyer's guide, with an in-depth chart.

A NEW KATIE PARKER MYSTERY: Who's robbing houses and leaving strange gifts behind? Katie, Don and Sherlock-the-Computer try to find out in "The Case of the Crystal Cat's Lair."

SOFTWARE SCANNER: Introducing a new monthly department—a regular sweep of new software programs. ENTER rates the MVPs (most valuable programs) in music, art, science, math, spelling, and other areas—and warns you away from the less-than-great packages.

PLUS: Using computers to communicate with animals ...Hot news in "Show Beat," "News Beat" and "Pacesetters"..."Basic Training" brings you programs for your computer, and "User Views" sizes up the newest computer games.

WINNERS!

The following 50 readers were winners of ENTER T-shirts in our INPUT Poll #2 drawing.

Ronald E. Price, WI; John Griffis, Jr., FL; Joel Tanzi, MA; Phaedra Leffel, AZ; Jeff Gould, IL; Edward Yuh, CA; Vernard Edwin Brown, NY; Cheryle Ann Ganal, HI; Jason Cross, CT; Scott Bouza, MI; Mark Schiavo, MA; Patricia Falkenberg, WA; James Ken Butler, Yokosuka, Japan; Robbie Opitz, PA; Rynda Collins, SC; Poppy Thurman, MO; Angelica Ruiz, NY; Linnea Hitson, IL; Jason Anderson, TN; Erik Ogan, CT; Chris Adler, VA; Heather Watson, OH; Donald Dibble, Jr., NY; Joel High, IN; Robby Reynolds, CA; Tammy Schalk, OH; Jennifer Hall, MN; Dana Lynn Garehime, CA; Joe McClernon, MO; Colin Cox, KS; Tonio Grant, NY; Natalie Scholl, CO; Jim Transue, ID; David Brooks, NJ; Christopher Scott Green, GA; James Devensey, NM; Adrienne Burgess, TX; Norman Ahlers, PA; Marci Kanner, NY; Jim Burns, NY; Ben Bretz, ID; Terri Thorn, PA; Ricky McKibben, CA; James Wilson, PA; Bryant Kittle, CA; Joe Burkett, OH; Ann Struemke, CA; Melissa J. Gregorio, NY; Alan Hodges, MO; Jenny Marasia, TN

The following 50 readers were winners of ENTER T-shirts in our INPUT Poll #3 drawing.

Brent Halliburton, TX; Mike Schenck, ID; John Lee McDowell, CA; Michael Ryan, NJ; Erica Hunter, CA; Justin Nation, MD; Mary Beth Coyne, OH; Kelly Watson, CA; Rich Caley, OH; Seth Gaynes, CT; Annie Poage, CA; Scott Elder, MA: Burch Antley, SC; Heather Marsh, AL; Jeremy Staum, NJ; Jason Markum, IL; Lori Hutcherson, AL; Rachel Roberts, PA; Becky Snoek, MI; Aditi Shah, OH; Melanie King, IN; Jason Donovan, FL; Samantha Stricklin, NY; Michael Dinler, PA; Steve Leonard, NJ; Daniel T. Ferry, OR; Bill Rhodes, PA; Sonya Stewart, GA; Jeff Casanova, NY; Jim L. Troutman, MA; David Maynard, PA; Pamela Garcia, PA; David Outwater, CA; Jordan Katzen, PA; Mike Cunningham, PA; Chris Athanas, MD; Alice Sublett, IN; Melanie Nickell, OH; Ruben Rodriguez, NY; Tiffany Russell, IN; Mandy Link, IN; Amanda C. Farr, KS; Michelle Kain, NC; Erica Hyde, IL; Peter Joyce, MO; Kris Ganjam, MO; Theodore Striphas, NY; Robin Coscia, FL; Karla Wick, NJ; Bob Freeman, MA

popcorn
POP
Space Turkeys

If your parents complain that this is what all computer games are doing to you, they obviously don't know about Spinnaker.

With most computer games the biggest challenge isn't the game. It's keeping your parents from objecting to it.

Now, Spinnaker has the answer. It's called the Learning Adventure Series, and it's a whole bunch of great games that will challenge and inspire your imagination for hours. But won't inspire hours of complaining from your parents.

Of course, even if they didn't offer this nice little benefit, our games would still be fantastic. Because they've got the kind of built-in, long-lasting excitement and adventure that make great games great. You'll explore, figure, and investigate your way through all kinds of situations. You can bargain with aliens, search a haunted house, even build your own railroad empire. And that's a lot more fun than most games that are "bad" for you.

So the next time your parents complain that computer games are turning you into a vegetable, tell them about Spinnaker's Learning Adventure Series.

Then you can get down to the business of fun and games in peace and quiet.

Spinnaker Learning Adventure games are available for Apple,® Atari,® IBM® and Commodore 64™ home computers.

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You're in charge of an old-time railroad – and whether it turns into a bonanza or a bust depends on how well you run it. But either way you'll find that working on this railroad is a challenge – and a lot of fun! **Ages 10-Adult.**

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It's New!
ADVENTURE CREATOR.™
Design a challenging adventure game that you or a friend can tackle – or let the computer design one for you. It's complex, exciting – utterly addictive! **Ages 12-Adult.**

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IN SEARCH OF THE MOST AMAZING THING.™
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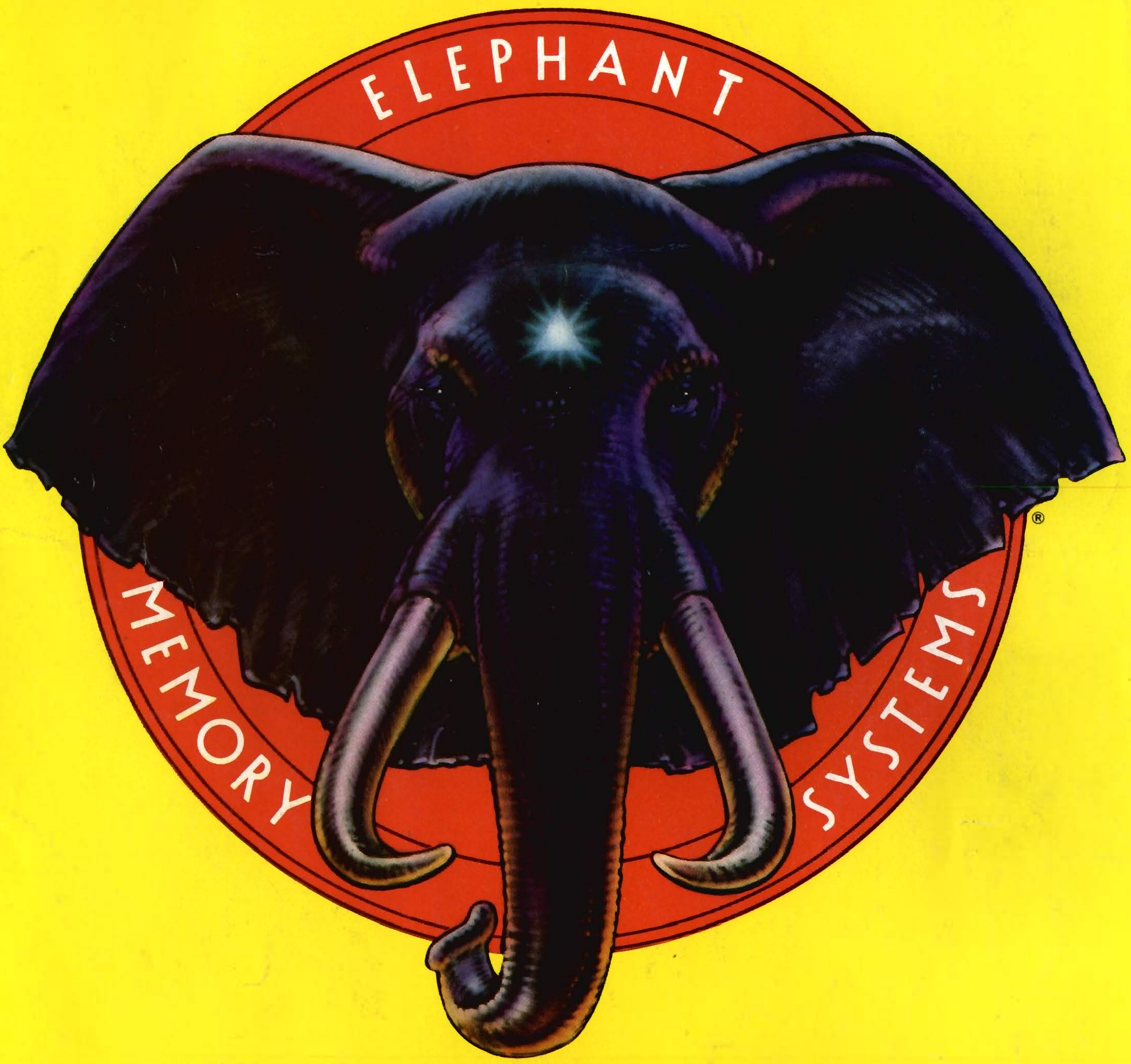

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